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# Europe Report

## SCIENCE AND TECHNOLOGY

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28 AUGUST 1986

EUROPE REPORT  
SCIENCE AND TECHNOLOGY

## WEST EUROPE

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## WEST EUROPE/AEROSPACE

### BRIEFS

FRANCE NAMES HERMES CHIEF--France has its "Mr Hermes": Philippe Couillard, who has just been appointed by CNES [National Center for Space Studies] to lead negotiations between the project's various European partners. At 41, this graduate of the Polytechnique and of ENSAE [National Higher Institute for Space and Aeronautics] is already a regular in space programs. At CNES since 1970 and responsible for the SPOT project in 1978, he has been vice president for industrial activities at the Toulouse space center for 2 years. [Text] [Paris SCIENCES & AVENIR in French May 86 p 17] 25033/12947

ARIANE'S NEW FIRST STAGE--The first stage (L-220) of the new Ariane 4 rocket is to leave Aerospatiale's Les Mureaux plant for the Kourou space center where it is scheduled to be launched next October. A derivative of the first stages of the previous Ariane versions, the L-220 is 25 meters high, making it 6.6 meters longer. It will carry 226 metric tons of propellant requiring the SEP [European Propulsion Company] motors to run for 214 seconds instead of the usual 145 seconds. Aerospatiale has considerably strengthened the structure of this stage to allow it to hold four 30-metric ton thrust units each 19 meters long in its most powerful configuration. Depending on the number and type of boosters added to the first stage, Ariane 4 will weigh up to 400 metric tons at lift-off (almost twice Ariane 1's weight). The 60-meter high Ariane 4, capable of putting 4-meter diameter payloads of between 1.9 and 4.4 metric tons into a 36,000-meter orbit, is destined to become the sole European launch vehicle until 1995, as its launch price per kilo of payload is 40 percent less than that of Ariane 1. [Text] [Paris L'USINE NOUVELLE in French 22 May 86 p 13] 25043/12947

CSO: 3698/A157

## WEST EUROPE/BIOTECHNOLOGY

### SCALE OF EEC BIOTECH ACTION PROGRAM REVIEWED

Paris BIOFUTUR in French Apr 86 pp 3-4

[Article by D. de Nettancourt, head of the Genetics and Biotechnology Division, responsible for research and training activities of the biotechnology program of the EC Commission (DG XII, Brussels): "EC Biotechnologies: One Program Follows on the Heels of the First"]

[Text] The first European research and training program in the field of biomolecular engineering (BEP, Biomolecular Engineering Program), which was launched in April 1982, has just ended (31 March 1986). It is now time to assess these 4 years of work by the European Community [EC].

In spite of its slow gestation and the fact that its objectives were restricted to biomolecular engineering applications in agriculture and the agro-food industry and despite its modest budget (Fr 100 million), the BEP has the following achievements to its credit:

1. Its undeniable enormous success: Almost 300 proposals, mostly from the best laboratories in the Community, were submitted in response to the call for proposals published by the European Commission, with similar success for the training activities which complemented the contract research program. More than 200 young scientists applied to participate in these activities, and 84 training contracts (ranging from 6 to 24 months) were negotiated. By using the best research centers in the EC as host laboratories, it was thus possible to lay the foundations of a major European multidisciplinary training institute "without walls." Such an institute is indispensable to the development of modern biotechnology, as no member state can do this on a purely national basis.
2. The establishment of a transnational network of research activities based on European cooperation. Encouraged, even pushed, by the Commission at the program's inception, 63 cooperation agreements (involving exchanges of materials and researchers as well as pooling of certain infrastructures or total integration of activities) were concluded among the 103 laboratories participating in the BEP. This network, the first of its kind in Europe, made it possible to pool resources in order to facilitate the application of modern genetic engineering techniques, and it is worth noting that worldwide at the end of 1984 only 86 plant genes, as opposed to 1,100 mammalian genes, had been

partially characterized. Many genes which could play an essential role in milk fermentation, production of new vaccines, and transformation of wood components have been cloned; [also notable is] the development of bioreactors for the coimmobilization of microorganisms and enzymes, as well as the use of multienzyme systems necessary for regeneration of cofactors indispensable for synthesizing chemical substances of industrial value. Some of the developments in progress have reached the pilot project stage.

This record of achievements should not obscure the shortcomings of the BEP, which has certainly suffered much from its modest level of funding. EC support for contractual research activities has barely exceeded an annual average of Fr 270,000 per laboratory, i.e., less than the cost per annum of one research scientist and his operating expenses in most EC countries. Whereas university researchers, who are used to national budgetary restraint, may be happy enough to accept such modest funding, which in many cases still enables them to significantly increase their work volume, the situation is totally different in industrial laboratories where the BEP budget has often seemed ridiculous. This situation, coupled with the fact that precompetitive research with its long-term objectives and openness is often far removed from the concerns of business leaders, undoubtedly explains why very few industrial laboratories (less than 10 percent) have taken part in the BEP. Some have had second thoughts on seeing the quality of the EC work and are now asking to join the networks set up by the Commission.

BEP is dead, long live BAP. This is the name of the new program covering the period 1985-1989: Its aim is to pursue, expand, and complement the work already carried out by the EC within the BEP framework. The program's budget totals Fr 370 million. In addition to the areas covered by the BEP, the program includes the provision of infrastructural measures for the pooling and improvement of existing R&D facilities in the member states (data storage and processing, collection of biotics publications), and specific projects concerning protein structures, genetic engineering applications for industrial microorganisms, and development of new in vitro systems to analyze the pharmacological properties and toxicological effects of molecules. It also provides for coordination activities aimed primarily at developing the strategies required for harmonious and effective development of biotechnology in the Community. (Footnote) (Responsible official: Mr M. Cantley (Coordination Unit for Biotechnology in Europe), Head of Division, DG XII, Brussels)

It should be noted that the actual implementation of the BAP training and research activities does not differ in approach from the BEP. However, in the selection of research projects very high priority is given to joint proposals from laboratories in different member states in order to maximize transnational cooperation. High priority is also accorded to proposals from industrial laboratories or to those involving the direct or indirect participation of industry. The research contracts contain specific clauses on the protection of intellectual property.

Following the publication of the calls for proposals, more than 1,300 projects had been submitted to the Commission by 1 March 1986. The selection ratio (proposals selected/proposals submitted) will probably be less than one to seven and, as the initial selection meetings have shown, a very large number of high-quality proposals will unfortunately have to be turned down by the Commission.

It is possible that the BAP may be reviewed during 1986 and a supplementary budget granted. In particular, this would permit reconsideration of some of the proposals and an increase in the range and effectiveness of EC research in the biotechnology field.

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CSO: 3698/A132

## WEST EUROPE/BIOTECHNOLOGY

### SWEDISH ALFA-LAVAL BIOTECH SEPARATOR TECHNIQUE DESCRIBED

Stockholm KEMISK TIDSKRIFT in Swedish No 7, Jun 86 pp 51-52

[Article by Rainer Saxen]

[Text] Biotechnical separators are a rapidly expanding sector at Alfa-Laval today.

Even though the biotechnology industry is new, this company has manufactured yeast separators since 1898. These devices concentrate baking yeast from the surrounding liquid.

"Today's biotechnical separators must meet extremely high requirements with regard to hygiene and sterilization," said Gunnar Aronsson, chief of development at Alfa-Laval. The company's newest separator for bacteria and yeast products is totally closed and can be sterilized by steam at 121°C.

"We have tested it with coli bacteria, but it can also be used with other bacteria."

The bacteria are separated from the liquid they lived in during the fermentation process. Thus, the bacteria itself, which contains the desired product such as an enzyme or protein, is harvested. After the separation, the bacteria are ground up and run through the separator once again in order to remove the cell walls and, in this way, to obtain the desired product in solution in a particle-free liquid. After this, the process is continued using purification methods of a different kind.

These bacteria separators must act much faster than conventional separator types. In the latest model, the g-number is as high as 12,800, which is required for the separation of cells or parts of cells.

This entire section of the process can be sterilized with pressurized steam. There is a double jacket, so that the coolant can circulate around the entire rotor. Because of the high rotational velocity, heat of friction is formed within the apparatus. Many biotechnical products are sensitive to heat. For this reason, it is important to eliminate any heat buildup.

The centrifuge installations can be categorized in three classes according to an American standard (Biosafety Levels).

The first class, BL 1, requires that it be possible to inactivate the micro-organisms in the system, that aerosols from the system be minimized, that contact with the surrounding air occur through a sterile air filter, and that approved sterilization procedures be utilized.

For BL 2, there must be an automatic sensor that gives an indication in case of leakage.

To meet the requirements of BL 3, the entire facility must function at as low a pressure as possible.

Results of test runs with the E-coli K 12 show that the concentration of solid particles increases tenfold in the concentrate, from 5 percent to 50 percent. This reduces solid particles, i.e. bacteria, in the clear liquid to less than 0.01 percent.

In order to determine the amount of damaged cells, samples were analyzed from the liquid input, the liquid outlet, and the concentrate. The protein contents were determined in these tests. The protein concentrations were equal, about 1 g/liter, at the inlet and at the outlet. This shows that no cells were damaged in the inlet and acceleration zone.

In the liquid from the concentrate, the protein content was 3 g/liter. This slight increase points to a limited breakage of cell membranes and the release of periplasmic proteins.

"This fall a new bacteria separator will come out on the market. It will have continuous emptying and a higher input capacity," said Gunnar Aronsson. He was extremely secretive about the details of this machine, however.

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CSO: 3698/535

## WEST EUROPE/COMPUTERS

### FRENCH MILITARY DEVELOPING LTR-3 SOFTWARE FOR COMMERCIAL GOALS

Paris ZERO UN INFORMATIQUE in French supplement to 14 Apr 86 pp 32-33

[Article by Didier Krajnc: "Military Software Engineering: The False Controversy Between ADA and LTR"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Excerpts] Two languages for military real-time systems have often been in conflict in France: ADA and LTR. The former was chosen by the U.S. Department of Defense [DOD], and subsequently some European defense departments have followed suit. The French military, however, stands out in its insistence on the use of LTR-3...yet they have not renounced ADA; for they say, "The two languages will be integrated within the same software engineering workshop," called Entreprise marketed under the aegis of CELAR [Armament Electronics Center], the assessment body of the DGA [General Armament Delegation].

ZERO UN INFORMATIQUE therefore asked Pierre Parayre, DGA chief engineer in charge of data processing coordination (and thus responsible for LTR), to explain exactly what Entreprise is. "ADA," he explained, "claims to be universal, and thus does not apply perfectly to real time; furthermore, it is an ANSI standard, not an ISO standard, not even a NATO standard although NATO does recommend it for control systems. Therefore, despite its origin, it is strictly an American standard and there is no reason why France, always anxious to maintain its independence, should adopt it!"

In fact, the history of ADA and LTR has several elements of common origin. In 1976 the French Ministry of Defense participated in the HOL-WG (High Order Language Working Group) that the DOD commissioned to study the requirements for a future high-level language. This committee's work led to the development of a set of specifications dubbed Ironman.

For its part, in 1967 the French military launched the LTR (real-time language) project, which became operational in 1972. Two years later a second project was initiated to update the first: Thus LTR-2 was born in 1977. Rather than starting from scratch, the DGA naturally decided in 1980 to adapt LTR-2 by integrating the Ironman specifications; LTR-3, the fruit of this third project, in which Syseca, CIMSA [Military Space and Aeronautics Data Processing Company], and STERIA [R&D Company for Data Processing and Automation] participated, was born in 1985. This project will require a total investment of about Fr 100 million over 5 years. This budget may appear excessive,

but the research involved has not only produced the language: "LTR-3 is part of a portable software engineering workshop, Entreprise, which makes it a much more powerful tool."

Entreprise integrates a production workshop of real-time systems: It covers their programming, debugging, and maintenance phases and ensures program configuration management. The reference workshop (in a way, the Entreprise standard) is maintained by CELAR, the DGA body responsible for acceptance and evaluation of projects. It is this body which officially certifies the different commercial versions of the product: Syseca has adapted Entreprise to the SM-90 of the CNET [National Center for Telecommunications Studies] (i.e., the Bull SPS-7; STERIA and Thomson-DSE have developed it on Apollo. In 1987, it will operate on VAX (thanks to Syseca and DEC), on Gould SEL-32, and Perkin-Elmer 3200, and also on SPS-9 (alias Ridge) thanks again on Syseca in collaboration with Bull. SUN and Unigraph versions will also be available thanks to CSEE [Electronic Enterprises and Signals Company] and CR2A.

The standard version operates on Micromega 32; CELAR delivers the sources in Unix to distributors wishing to use that. "At present, these source programs are written in Pascal; they will be in C by the end of this year." In principle, certification guarantees portability, in other words, "Whatever the host machine, the operation of Entreprise is strictly identical."

Among the military projects underway, six are using the Entreprise workshop, two of them are being conducted by Thomson (Arabel and Apic) and four by the DGA:

- Hades (tactical missiles);
- The SNLE-NG (nuclear rocket-launching submarine--new generation);
- The future Leclerc tank;
- The PAN (nuclear aircraft carrier).

Entreprise is also of interest to other organizations such as CNES [National Center for Space Studies], or even civilian industry (Aerospatiale).

LTR-3, the unit's initial language, uses the principles of Pascal: "Its efficiency, its programming security, and also its simplicity mean that anyone who knows Pascal can learn LTR-3 in 1 week." For the time being the only target device on which it can be used is the Motorola MC-68000, but in 1987 it should be compilable for the 32-bit 68020 and for the CMF (the French military computer built by CIMSAs).

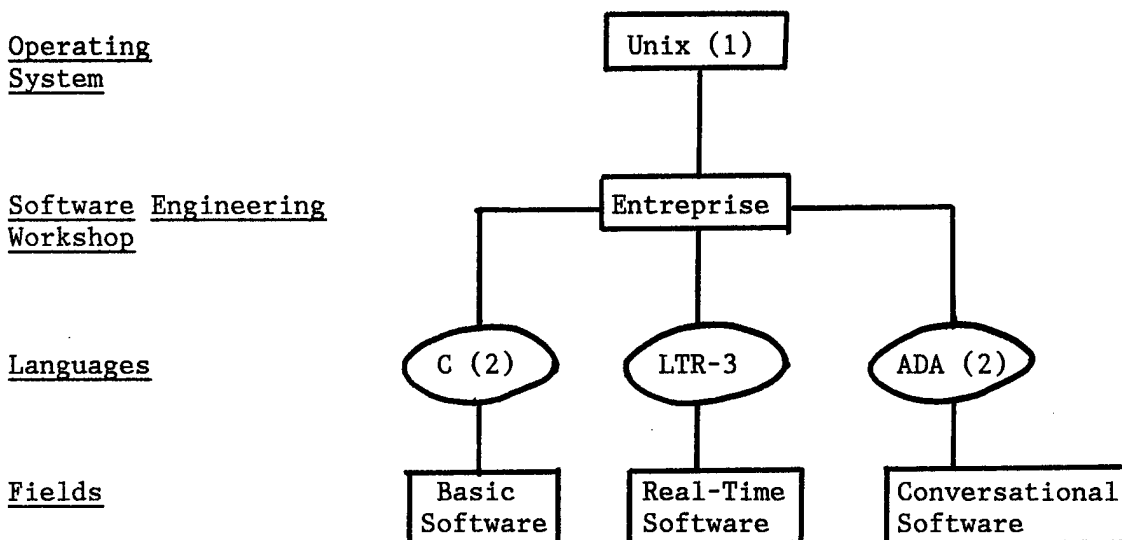
For Pierre Parayre, it is quite simple: "The ADA market does not exist. To say nothing of data management, Fortran 8X is indispensable for numerical calculation, and the CCITT [Consultative Committee of International Telephone and Telegraph] has standardized CHILL [Current Hogging Injection Unit] for telephone switching."

"The Cobol experience will not be repeated because conditions have changed: the DOD represents only 6 percent of the market--and the CHAPS project in the UK for the development of an ADA programming environment has quite simply been abandoned."

By contrast, the future of Entreprise would appear promising: the French Ministry of Defense is willing to invest about Fr 20 million per annum. It will be promoted beyond national borders and will be used initially in European projects ("The British military, as well as manufacturers in aerospace, are interested, and there is a very strong possibility that Hermes will be programmed with Entreprise). International projects will follow ("We are going to export it to the United States, as it will be in the SUN and Apollo product lines").

Technically, in 1987 Entreprise will integrate both the ADA and C languages alongside LTR-3. Logically, a software engineering workshop must cover all domains: "real time with LTR, basic software with C, and...transactional software with ADA."

Graph p 33. The Environment of the Entreprise Software Engineering Workshop



(Footnote 1) (Or any other operating system using a C-compiler)

(Footnote 2) (Development in progress, to be operational before 1988)

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## WEST EUROPE/COMPUTERS

MAY 1986 STATUS OF PERSONNEL, PROJECTS AT ECRC

Paris LE MONDE in French 28 May 86 p 17

[Text] Three European computer manufacturers have established a joint laboratory in an effort to make machines more intelligent and easier to use.

A modern building between the town center and the airport of Munich, in an office district. Glass doors, carpeting, engraved plaques on the lobby walls. One of them says ECRC, European Computer Industry Research Center. A laboratory in this somewhat luxurious building? The image of workbenches and beakers fits poorly in this decor; that of soldering irons clashes with the carpet. Yes, but information processing, at least its software facet, is a particularly clean science. And the ECRC is a laboratory where manual activity is limited to the writing and typing of a few commands on keyboards, and where the researcher's tools are thought and the computer.

Names can be meaningless or deceptive, but that of the ECRC is perfectly accurate. It is indeed a research center, dependent on the European computer industry, or at least on three manufacturers which, by any standards, rank among the top leaders of the Old World. Bull in France, ICL in Great Britain, and Siemens in the Federal Republic of Germany decided, in 1983, to establish a joint laboratory to work on computer-aided decision making.

This field is connected primarily with artificial intelligence, although it extends to other areas (man-machine interaction, systems architecture). It was chosen because there was clearly a need for knowledge in the field, and because any directly marketable applications were sufficiently far-off that the companies, which compete in several markets, but which highly value a position between the American anvil and the Japanese hammer, can support each other without reservation.

Brussels has had to look approvingly on this undertaking which would undoubtedly not have occurred without the contacts established in the framework of the Esprit program, but the project is being carried out independently of the EEC. The companies negotiated amongst themselves and designed a joint project with little difficulty.

## Nine Nationalities

The agreement was signed in December of 1983. Established as a company under German law, the ECRC opened on 1 January 1984 with a staff of three. It numbered 12 employees in July, almost 30 by the end of 1984, and 50 a year later. The staff should stabilize at 60 during the current year: 50 researchers and 10 persons for technical and administrative management. It will never be a large laboratory, but with its total staff and an annual budget of some 20 million Deutsche marks, it has the means to work effectively in the field assigned to it.

The company and its location are German. The working language is English--as required by internationalism and the information processing field. The researchers are of nine different nationalities. The director is French. Mr Herve Gallaire has worked for some years in the artificial intelligence unit of the CGE research center in Marcoussis. He was hired by Bull for his current position, as were most members of the laboratory staff, who are representatives of one of the three parent companies, often hired as contractors and assigned to the ECRC for an extendable period of 3 years. Some researchers from government and university laboratories have come for internships of several months, occasionally remaining.

The framework of the research program hinges on four major tasks. The first is logic programming. The ECRC is working on extensions of the language Prolog. One goal is to increase the language's capacity of expression by introducing knowledge-structuring elements, thus bringing Prolog closer to the "object-oriented languages."

Another goal is to develop programming by constraints, a means for the earliest possible reduction in the branching of options to consider, thereby increasing the efficiency of the programs. One group is working to improve the programming environment, particularly to aid the development of programs written in Prolog. Finally, a "portable" compiler is being written for this language, which each of the parent companies will be able to easily adapt to its own hardware.

An additional task is the development of intelligent data bases. The idea is to introduce a much stronger structure than that of the currently used relational systems, by introducing concepts of entities, attributes, classes, hierarchy, and the inheriting of programs between classes [sic]... Many studies are being carried out on this question, and Mr Gallaire believes it will soon be possible to combine them.

## Ten Times Faster

The third major task is the architecture for symbolic computing systems. The ECRC is not equipped to build hardware, and works instead on the concepts. One team is studying parallelism in logic programming. Another is working on a coprocessor which, when connected to existing computers, would make it possible to obtain reasoning speeds on the order of 500,000 logical inferences per second, or about 10 times faster than currently-marketed systems.

While the above tasks have many points in common, the last one stands out. It is man-machine interaction. It includes, on one hand, work on user aids--the use of graphics, text generation; and on the other, studies on how users receive and accept what is proposed.

The ECRC proposes its own research projects, which must be approved by the parent companies, and are then followed by a scientific committee. Information is shared during seminars, which usually last 2 days. The first day, the ECRC reports on its work. The next day, the companies indicate their positions in the field. Mr. Gallaire considers it desirable to hold these seminars at a rate of one seminar per year per major task field.

13250/5915

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## WEST EUROPE/COMPUTERS

### BRIEFS

BULL'S FINAL 1985 RESULTS--In accordance with the announcement made in early March by Bull's chairman Jacques Stern, the board of directors over which he presided has announced the final 1985 results, which showed a marked recovery compared with 1984. The group's profits amounted to Fr 110.2 million in 1985 (compared with a loss of Fr 489 million in 1984). Its consolidated turnover went up by 18.5 percent to Fr 16.1 billion. The profits of the parent company (Compagnie des Machines Bull) totaled Fr 35.2 million. In order to clear the balance sheet, part of the carry over must be transferred to the reserve and a capital decrease could take place reducing the price of the stock from Fr 30 to Fr 21.50. [Text] [Paris ZERO UN INFORMATIQUE in French 28 Apr 86 p 6] 25033/12947

PHILIPS' FIRST 1986 RESULTS--Eindhoven--Philips' profits decreased by 45 percent, to 144 million guilders, during the first quarter of the 1986 fiscal year. Its turnover decreased by 9 percent, to 13.06 billion guilders. [Text] [Amsterdam COMPUTABLE in Dutch 6 Jun 86 p 27] 25026/13046

MATRA'S 1985 RESULTS--Amsterdam--Matra's profits increased by 223 percent, to Fr 113 million, during the 1985 fiscal year. Its turnover increased by 8 percent, to Fr 14.88 billion. [Text] [Amsterdam COMPUTABLE in Dutch 6 Jun 86 p 27] 25026/13046

CSO: 3698/A168

## WEST EUROPE/FACTORY AUTOMATION

### FRENCH ROBOTICS FIRM IN EUREKA

Paris L'USINE NOUVELLE in French 22 May 86 p 60

[Article by Antoine Schoen "Fr 3 Million from Rossignol to Finance the Growth of AID"; first paragraph is L'USINE NOUVELLE introduction]

[Excerpts] A welcome injection of fresh capital from the world leader for the small Grenoble-based company. Equity capital which will help it avoid take-over and allow it to enter the field of mobile robots where it can build on its technological lead.

It has been an auspicious week for Francois Danel, chief executive officer of the Grenoble-based robotics company AID [Dauphine Industrial Assistance, who has just added three promising successes to his credit.

First, AID has obtained financial backing from Rossignol. The world's leading ski manufacturer will contribute Fr 3 million to boost the robotics firm's equity. Francois Danel also has a second reason to feel satisfied: An AID proposal for a EUREKA project involving robotic control and emergency services has just been approved. AID will manage this FR 200-million-project named Mythra. Finally, AID has signed an agreement with the ITMI [Industry and Technologies of Intelligent Machines] company which will strengthen its position on the educational robotics market.

This major offensive marks a new stage in the development of AID as it prepares to manufacture robots for the international market and consolidates its financial base.

Founded by Francois Danel in 1974, AID rapidly became one of the leaders in industrial automation in the Rhone-Alpes region. It then took the plunge into the robotics market. More than 120 of its V-5 robots have been sold allowing AID to achieve a Fr 35-million turnover in 1985 with a staff of 46.

Despite this steady growth, the Grenoble company could no longer finance its own expansion. It just managed to balance its accounts in 1986. Francois Danel, who holds 48.7 percent of the capital (Fr 5,124,000: 15.2 percent owned by Finovelec, 10.7 percent by Finovectron, 10.7 percent by Epicea, and 12.3 percent by Jean-Pierre Auzimour), did not want simply to sell off his company for absorption into a group.

Initially he intends to concentrate on AID's traditional activities: industrial robots (handling, assembly), educational robots, and specific-purpose robots (sewing, cutting meat and wood). However, in the longer term Francois Danel attaches a lot of importance to mobile robots. AID's participation in the EUREKA program augurs well in this respect, confirming the company's technological lead in this field and providing further impetus.

25043/12947

CSO: 3698/A157

## WEST EUROPE/FACTORY AUTOMATION

### FRG'S BMW USING CIM, CAD TECHNIQUES

Paris L'USINE NOUVELLE in French 5 Jun 86 p 49

[Article by Philippe Escande: "BMW Puts Brains into Its Engines"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Six thousand engineers and technicians gathered at a research center to design automated cars that can be produced in a fully computerized facility...and a new factory that will operate almost completely without inventory: BMW is running smoothly.

Like its competitor in Stuttgart (Daimler-Benz), BMW has not been affected by the recession. For the past 10 years, the Bavarian firm has in fact been hiring nearly 2,000 people per year. With comfortable profits of DM 1.29 billion before taxes (more than Fr 4 billion), it has decided to focus its efforts in two directions: a new assembly plant in Bavaria and a gigantic R&D center that will bring together more than 6,000 engineers and technicians, i.e., 10 percent of its work force.

Nearly Fr 3.2 billion have been invested in this center whose first section is due to be finished this year. Last week in Munich, Wolfgang Hans Reitzle, a member of the board of directors, explained: "One of our major concerns from now on is to design cars that are easier to automate. This objective has to be taken into consideration beginning with the design of models." That is why manufacturing and design engineers, currently scattered at different sites, will now work at a single location.

This center is also expected to develop the concept of a fully automated factory (CIM [Computer Integrated Manufacturing]). At present, BMW develops a new car in 5 to 6 years. With the new research center and the general use of data processing (CIM, CAD [Computer Aided Design]...), the manufacturer hopes to reduce this period by 20 percent. At the research level the center will benefit from the know-how of different firms which BMW has recently bought into: Loewe Opta for electronics, Cisigraph for CAD, as well as a small Swiss Company specializing in synthetic materials.

Fifteen Km from Supplier to Factory: No More Inventory

Another substantial investment, the construction of a new factory at Regensburg in Bavaria, will begin production by the end of this year. Built

on a 142-hectare site, in its final stage it will produce 600 cars per day with 3,500 people. Initially only assembly will be done there, later also painting and body assembly activities. With 1,375 engine variants and nearly 2,000 versions, the Bavarian firm handles nearly 79,000 different products. Consequently, logistics is at the heart of this factory. The objective is to limit inventories to a minimum.

Transport will be completely computerized and many subcontractors will be actively encouraged to settle in the vicinity. "Just in time" delivery agreements have already been concluded with some firms, e.g., with Schmitz & Co, which produces seats. They will be ordered 3 hours before actual installation in the vehicle. The truck travelling the 15 km that separate the two factories will radio its position to production. Thus, all existing inventory will be on this truck.

BMW is anxious to expand this practice because, given the large variety of models, production runs are relatively short. As a result assembly automation will not exceed 8 percent, but this is still on a par with the average car manufacturer. "We do not just build cars," concluded Wolfgang Hans Reitzle, "but products for social differentiation."

The Munich firm is in a sufficiently good state of health to be the envy of more than one car manufacturer..even Japanese.

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## WEST EUROPE/FACTORY AUTOMATION

### JAPANESE MACHINE TOOL STRATEGY IN FRANCE

Paris L'USINE NOUVELLE in French 12 Jun 86 p 52

[Article by Antoine Schoen: "The Nipponese Trojan Horse"; first paragraph is L'USINE NOUVELLE introduction--boxed material covers interview with Toyo Kato]

[Text] Condemned to export, but struggling against Western protectionism, Japanese machine tool manufacturers have chosen to open factories abroad. The chief executive officer of the Japanese Toyoda group in France explains their strategy below.

American protectionist threats, repeated rebukes from the European Community.... The situation is becoming more delicate for Japanese machine tool manufacturers. The subject of the argument is Nipponese export--or rather its progression.

Indeed, Japanese deliveries to the EEC reached 79 billion yen last year, i.e., an increase of 52 percent. At the same time, deliveries to the United States rose to 200 billion yen, i.e., a 23-percent increase.

The effort by Western governments to shield themselves has led Japanese manufacturers to change their strategy. Condemned to export by the threat of a sagging domestic market, Nipponese industrialists have stepped up their programs of industrial settlement in foreign markets.

Yamazaki, Makino Milling, and Hitachi Seiki have already launched their American production. Mori Seiki, Okumoto, Okuma, Miyano, and Toyoda are also getting ready to open industrial branches across the Atlantic. In Europe it was Yamazaki that opened the door by its 1984 decision to build a factory in the UK. Toyoda followed soon thereafter. It established its bridgehead in Europe last year by acquiring 50 percent of Ernault-Somua's capital.

The robust reorganizational activity within the new Ernault-Toyoda Automation (ETA) company reflects the importance of this branch for the Japanese manufacturer. Toyo Kato, Toyoda's vice president, who will succeed Shigemitsu Asai as president of the company next month, explains his strategy.

[Box]

Toyo Kato, Toyoda Chief Executive Officer: "We Are Going to Open a Factory in Chicago"

L'USINE NOUVELLE: After 1 year of business, has ETA already allowed Toyoda to strengthen its sales outside of Japan?

Toyo Kato: This 1st year's goal was to strengthen ETA's foundation. We did that. We invested Fr 140 million in the modernization of the product lines and production tools at Cholet and Montzeron.

UN: Will Toyoda continue to manufacture machine tools? Do you have ambitions in factory automation?

TK: We will maintain our strategy by concentrating on machining centers, grinders, and specialized machines. We will keep our assembly robots, which we sell to Renault Automation, but we are planning neither an alliance nor an offensive on this front.

UN: Toyoda has gone down in the ranking of Japanese machine tool manufacturers. Fifth in 1983, with a turnover of \$136 million, you were only eighth in 1984 with a turnover of \$158 million. Has this retreat been stopped?

TK: Our machine tool production went up in 1985. But competition is getting stiffer. The Japanese market is becoming harder. The more so because large customers have all decreased their investment programs--often by double digit percentages!

UN: A stronger yen compared to the dollar, a threat of U.S. protectionism, protests from Europe: an accumulation of handicaps. How are you going to handle it?

TK: Toyoda is not a major exporting firm. We sell less than 30 percent of our machines outside Japan. Nevertheless, our export policy should allow us to avoid these dangers. We are going to open an assembly plant in Chicago in August to Americanize our machines. And ETA's machines are Europeanized. That is their business, not mine.

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## WEST EUROPE/MICROELECTRONICS

### NEW PHILIPS HEAD ON STRATEGY, GOALS, JAPANESE COMPETITION

Rotterdam NRC HANDELSBLAD in Dutch Supplement to 23 Apr 86 p 4

[Article by Dick Wittenberg: "Every President Works for His Successor. C. Van Der Klugt, the New Boss at Philips"; first paragraph is NRC HANDELSBLAD introduction]

[Excerpt] C. van der Klugt (61) is the new president of Philips. He succeeds Dr. W. Dekker, the man who had shaped the firm in the past 4 years. If the new boss has anything to say about it, there will be more emphasis in coming years on improving profits. At the end of his term he wants profits to amount to 3-4 percent of turnover, as he says in the following interview.

"The president's job remains intact, just as it always has been. There will not be a Dekker-Van der Klugt team at the head of Philips." C. van der Klugt, named to be president of Philips yesterday, does not want to leave any doubt about that: he alone will lead the firm in coming years. For Dr. W. Dekker, the former president who was named yesterday to be chairman of the Supervisory Board, there is expected to be only a secondary role to play.

Needless to say, Van der Klugt adds that Dekker will also not take over any public relations duties that have fallen to the president in the past. "It is true that as chairman of the Supervisory Board Mr. Dekker will probably appear in public a great deal, even though his predecessors did so less often," the new president notes. "But times have changed since then. In recent years Mr. Dekker has undertaken initiatives--especially in regard to a united Europe--that go far beyond Philips itself. It is only reasonable for him to continue this crusade. Philips will certainly support him in this."

What is it like to be the successor of a successful president like Dekker? "I feel it is a special challenge to be able to take over and lead a winning team," says Van der Klugt with a broad grin. The new president laughs easily and often. "Actually you can only judge how a president performed 5 years after he leaves," he goes on. "Every president works for his successor. It is not so hard to do some somersaults in the short term and bring in some fast profits. However, when you are trying to gradually improve the company's position, the effects only become visible after a longer period. Mr. Dekker has laid a solid foundation. We will build on it."

## No Change of Course

Van der Klugt explains at length that his becoming president will not lead to extensive changes in policy. "The Management Board works as a team. That team has a captain. Changing the captain does not automatically mean a big change in course. The company strategy remains the same."

It is true that each new president brings with him new emphases, Van der Klugt says. He says he "wants to emphasize improving profits more than ever." "We will go on speeding up the pace, improving the quality, and with greater economies. We will go strengthening our position in the important sectors: consumer electronics, components, and some business activities." At the same time he acknowledges that this really does not represent new emphases.

Van der Klugt's predecessors--Dr. Ir. N. Rodenburg and Dr. W. Dekker--both put their foot in it when in their first interviews as president they were asked what profit they expected to see at the end of their presidency. In 1982 Dekker put it at 3 percent, while net profit last year was only 1.7 percent of turnover. Even so Van der Klugt too ventures unconcernedly on a prediction. He aims at a profit of 3-4 percent. "That is no fairy tale or illusion. That is bitter necessity," he says.

## 100 Years

Earlier Dekker too had mentioned that profit of 3-4 percent in connection with the year 1991, when Philips celebrates its 100th anniversary. Van der Klugt confirms that he does intend to stay on that long. "Wind and weather and shareholders permitting. In principle a person stays on the Management Board until he is 65. A 5-year presidency fits into that scheme of things," says Van der Klugt, who recently turned 61.

The new president has set three goals for himself. First of all, he believes that the firm "has to continue to be one of the leaders in the fields we operate in." "Otherwise, we become followers and that is not how our firm was built. We are making large investments in research and development. This effort will have to yield profits. That is only possible if we hold our fate in our own hands. If we do not become dependent on others, not for components and not in setting prices."

Next, Van der Klugt wants to go further in internationalizing the firm. The center of Philips' activities is still in Europe. "That will have to change considerably, because the world is changing considerably," he says pugnaciously. "We have to see to it that our strengths, though differently organized, continue to be aimed like a spear at the market."

Along with this plan goes Van der Klugt's intention to "continue or even strengthen Philips' super marketing position." He muses about expanding the firm's influence in Japan and the United States. In regard to the United States he is thinking in terms of lighting, consumer electronics, and chips, but especially of data processing systems. "We want to grow much stronger in that sector in the United States than we are at present." He does not rule out

takeovers in that sector. "That is often the fastest and also the cheapest way to acquire a share of the market. In principle we are interested in all data activities except in the big computers. But at the present time there are no negotiations going on to acquire companies."

Japanese

"There is no competitor in the rest of the world who can match us in marketing," Van der Klugt states, "without any conceit." "Building up a commercial position is the toughest and most expensive thing there is." He immediately takes the opportunity to accuse the American producers of consumer electronics of having given away their marketing position in their home market "to the Japanese for a mess of pottage." The Americans have made themselves totally dependent by buying the most important products from the Japanese. In that way the people in the United States have helped the Japanese get the upper hand. According to Van der Klugt they have "brought the Trojan Horse into the city."

The new president of Philips says that history threatens to repeat itself with the American chip industry. "This industry too could disappear in the United States if the government does not stop it." According to him, many Americans still do not "understand the strategic importance of a number of basic industries." "If Reagan sees electronics as an instrument of his future defense strategy, he has to take into account that he will be able to buy some vital components only in Japan."

Van der Klugt does not argue for protectionism to protect the American chip industry. What he does say is that anti-dumping measures could be taken. He also supports "temporary encouragement" of the industry, as there was in Europe when the duty on Japanese compact disk players was raised. "Such support must, of course, be limited and controllable and must be used only for new, vital technologies," he immediately adds. "It is unhealthy just to drag out the languishing existence of disappearing technologies."

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## WEST EUROPE/MICROELECTRONICS

FRANCE, FRG, NETHERLANDS JOIN TO WORK ON ADVANCED IC'S

Paris ELECTRONIQUE ACTUALITES in French 30 May 86 p 23

[Text] A framework for European cooperation in the field of integrated circuits is about to emerge. Companies, research centers, and universities in France, the FRG, and the Netherlands have, in fact, pledged their cooperation in an effort to develop the integrated circuit technology for 1995, according to the DIELI [Direction des Industries Electroniques et de l'Informatique]. This effort groups the CNRS, the CNET, the LETI [Laboratoire d'Electronique et de Technologie de l'Informatique], together with Thomson, Matra-Harris Semiconductor, SGS-France, Siemens, Valvo (a Philips subsidiary), Telefunken and its subsidiary Eurovil, and a Dutch consortium formed around Philips and the University of Delft.

This cooperative effort was announced during the fourth Franco-German electronics forum, recently held in Paris. The agreement, which could possibly be extended to include other countries (particularly Italy and Great Britain), outlines an initial European-scale response to the technological challenge raised by the American and Japanese giants, as is pointed out in industry circles.

The association is not directly linked to the cooperative undertaking begun in 1985 by Philips and Siemens, which is not involved in a technology, but in certain products which should appear by 1989.

This agreement represents the first stage in a collaborative effort aimed at designing the technology of components for use 10 years from now, notably 64 megabit memories (as compared to 1 megabit today), or integrated circuits which will perform sophisticated tasks, the DIELI adds.

A joint research center will possibly be established and experts are studying the distribution of tasks among the various partners. An initial 1-year phase will include definition of research programs, inventory of existing capabilities, and the establishment of organizational structures (division of capital among the various shareholders of the future joint company).

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### EUROPEAN HIGH TECH STRATEGY FROM EEC PERSPECTIVE

Brussels NOUVELLES DE LA SCIENCE ET DES TECHNOLOGIES in French Mar 86 pp 71-77

[Article by Michel Carpentier, Director General, EC Commission Task Force on Information and Telecommunications Technologies: "The New Technological Reality and the European Community"]

[Excerpts] Mastery of new technologies in general and information technologies in particular constitutes an essential element today in economic and political power relations between nations, a new dimension in the rivalry among states and world regions.

Prompted by business and the Commission, the EEC states have taken a certain number of initiatives in the area of information technologies and telecommunications (IT and T), which form a strategic whole pursuing the following objectives:

1. To improve Europe's scientific and technological base through industrial R&D cooperation programs (ESPRIT, RACE, BRITE), which also create favorable conditions for subsequent structural partnerships.

The major program today is ESPRIT (European Strategic Program for R&D in Information Technologies), to which RACE (Research and Development in Advanced Communication Technologies for Europe) and BRITE (Basic Research in Industrial Technologies for Europe) have already been added. BRITE involves the application of new technologies to traditional industries. These programs will be gradually rounded out by projects applying information and telecommunications technologies in certain fields (education, health, transportation, services, etc.).

Initiated in February 1984, ESPRIT is a program of transnational cooperation in the area of precompetitive research among industries, research laboratories, and universities. Its efforts concentrate on five fields: three basic fields of advanced microelectronics, software technology, and information processing systems architecture; and two application fields, office and factory automation (computer integrated manufacturing), covering the two most extensive working environments, office and factories. Each field's respective share in the ESPRIT program is roughly equal, with the exception of factory automation, which is, for the time being, somewhat smaller.

After 2 years of operation an initial status report can be outlined.

First of all, the interest generated has been quite remarkable: The number of proposals submitted (approximately 1,000) has been particularly high and imposed very strict selection criteria: About four proposals in five could not be adopted.

The projects actually underway involve 448 different organizations, comprising 263 industries, 104 universities, and 81 research institutes. Approximately 2,000 researchers and technicians will work full-time on the projects when fully implemented.

These projects differ widely in size. In addition to several major projects worth more than 20 or even 30 million European Currency Units (ECU), there are some 60 projects ranging from 10 to 20 million ECU, which is a fairly large amount for precompetitive R&D projects, and there is an even greater number of "small" projects involving less than 10 million ECU.

Because of this success, the bulk of Community funds planned for 5 years (750 million ECU) had been programmed by the end of the 2d year. This is forcing us to schedule a second phase for 1987 which we hope will fit in smoothly with EUREKA projects in this sector.

ESPRIT's success has just been confirmed by representatives from industry after an examination and evaluation of the ongoing projects.

Their report indicates that ESPRIT has succeeded in promoting trans-European cooperation which is now working at all levels (directors, managers, researchers), thus helping industry and universities to cooperate in developing a solid technological base in Europe by accelerating their projects and augmenting the cost-efficiency ratio of research. This report also provides guidelines for continuing the program:

- Maintenance of the precompetitive aspect of R&D;
- Expansion into projects integrating several advanced technologies;
- Support for Community-level research designed to ensure the best possible use of the results obtained.

To summarize, a very rich cooperational network is being installed thanks to ESPRIT projects. Large firms (more than 1,000 employees) cooperate in two projects out of three, while small- and medium-sized enterprises (fewer than 500 employees) participate in more than one-half of the projects. Another important indicator is the fact that 60 percent of the projects are inter-sectorial, associating firms from different sectors (for example, telecommunications enterprises cooperating with those specializing in data processing).

In addition, a synergism seems to have been created between industries, universities, and research institutes because four projects in five include at least one university or research institute.

We might add that the process of technological cooperation thus initiated with ESPRIT and RACE has already produced positive spin-offs in the area of industrial cooperation (artificial intelligence, large computers, semiconductor memories, telephone switches) as well as in standardization, where the Open Systems Interconnection (OSI) model developed by the International Standardization Organization (ISO) has been promoted significantly.

The objective of the RACE program is to create and promote industrial cooperation in the Community in order to develop the technological base needed for integrated broadband communication [IBC] in the 1990's. It involves a Community program for the development of services, infrastructures, and telecommunications equipment based on the results of a sector analysis carried out jointly by the principal public and private actors: industrialists, network operators, research centers established in the Community member states, and the EC Commission.

This program, which will be submitted for approval to the Council toward the end of 1986, is being preceded by a definition phase (RDP) [RACE Definition Phase] currently in progress.

Cofinanced by industrialists, network operators, and member state research centers, the RDP is endowed with a 40-million ECU budget, half is funded by the Community. Its objective is to define all the functional characteristics of IBC and to evaluate the principal technological options likely to come into play in the elaboration of IBC and in the development of the integrated services digital network [ISDN].

The RDP is being carried out by the Commission, which is coordinating the work of numerous groups of experts. The tasks of the different actors were established on the basis of proposals made in response to a call for offers. Evaluated by panels of independent experts, the proposals adopted were approved by the RACE Management Committee (RMC), which is overseeing the execution of the RDP and is composed of representatives from the member states. The proposals adopted constitute the basis for the work schedule.

The launch phase of the program involves two aspects. The first aims to define the functional and technico-economic characteristics of a system including the three basic elements of IBC: networks, terminals, and services. The objective is to define the concept of integrated broadband network. Four projects are devoted to this.

The second aspect concerns R&D. The objective is to undertake R&D work primarily in the most vital areas for the achievement of IBC. Because these areas include numerous technological options, it is necessary to make a technological evaluation of these options, to identify the most appropriate among them before embarking on large-scale R&D efforts. Twenty-seven projects are devoted to this aspect.

Eight activity fields have been identified as priorities:

-- High-speed integrated circuits (to improve transmission speed);

- High-complexity integrated circuits (for example, to develop video applications which so far have only existed for sound);
- Integrated "optoelectronics" (for greater reliability of microchips and optical fibers at lower cost and with improved cost-effectiveness);
- Broadband switching (to reduce the extremely high energy consumption of present-day switches and to pave the way for videotelephones);
- Passive optical components;
- Components for long-distance links with high-transmission rates;
- Specialized communications software;
- Large-size flat-screen display technology.

Here, too, the response to the call for offers was excellent: more than 80 proposals of great interest were addressed to the Commission by the principal "telecom" firms and national PTT offices within the EEC, a response three times greater than the funds available (20.1 million ECU).

The three proposals adopted involve a total of 102 participants: hardware, software, and systems enterprises; research institutes; and operators-- 220 participants in all when multiple involvement is considered.

Each proposal brings together an average of seven partners.

2. To create favorable conditions for the formation of a vast and innovative internal market with a stronger industrial infrastructure.

a) The Commission is trying to implement a European standardization policy. The growing importance of standards in the field of information technologies and telecommunications stems from their role in guaranteeing information exchanges, favoring more harmonious industrial strategies among Community firms, leading to a better exploitation of the Community market, and preventing unfair competition.

This Community policy is based on:

- The use of the OSI architectural model permitting the development of standards guaranteeing real compatibility between different equipment and systems and the ability to intercommunicate via networks, thus avoiding the enslavement of end-users by powerful firms which use their own "de facto" standards.
- The application within the EEC of common standards derived from international standards but interpreted uniformly.
- A distribution of responsibilities between the Community (political responsibility for the definition of a strategy); national, European

and international standards organizations (responsibility for definition and technical oversight); and finally industry (which is working with the Community to develop a strategy and with the standards organizations to implement it).

-- An important role entrusted to the European standards organizations: the European Standards Committee (CEN), the European Electrical Standards Committee (CENELEC), and the European Postal and Telecommunications Conference (CEPT) which work in close coordination with each other and with industrialists, end-users, governments, and the Commission.

-- A clarification of concepts (functional and developmental standards) and faster decisionmaking.

-- Concerted initiatives by international standards organizations to publicize European interests and give them an edge.

b) To assure the gradual opening of public procurement markets, notably in the telecommunications sector.

c) To favor restructuring at the European level. Efforts already made in this direction include:

-- Relaxation of competition regulations for joint research and subsidies for this type of research;

-- Creation of a legal identity for European-scale interest groups which should provide firms from different countries with a convenient juridical and fiscal structure for development of cooperation;

-- Steps to protect industrial patent rights;

-- Finance mechanisms.

New initiatives are expected in this area thanks to the EUREKA project.

d) Application of the external relations provisions of the Treaty of Rome to prevent measures adopted by third countries in the area of new technologies from creating obstacles to the smooth development of the international economy, notably in the areas of technology transfer, standardization, and competition policies.

3. To create dynamic interaction producers and end-users, especially governments, in order to stimulate demand and give energy to the market.

It is essentially a matter of encouraging certain public and private users to accept modern information and communications systems developed in pilot projects by the Commission together with public authorities (electronic mail, videotex services, management of customs offices and agricultural markets) or with large private users (transport industry, car manufacturers, etc.).

It is also a matter of promoting interaction between manufacturers of electronic, data processing, and telecommunications systems and products, on the one hand, and public, semi-public, or private end-users providing public services on the other. Such end-users include educators, doctors, the transport industry, general service suppliers (banks, insurance companies), etc. The EEC Task Force on Information and Telecommunications Technologies in cooperation with other Directorates General of the Commission is thus initiating activities to use dynamic interaction to encourage the use of advanced technology systems in the area of education, biotechnology and biomedicine, research, road safety, and automated banking. In this perspective, new projects with acronyms such as DELTA, BICEPS, PERT, DRIVE, and DIME will appear in the coming months.

4. To contribute to the establishment of advanced infrastructures, particularly in the areas of telecommunications, transportation, and basic research.

The Commission is developing an action program designed to create a European telecommunications arena. The aim of this action program is to equip Europe with an advanced telecommunications network as soon as possible. This network must provide highly cost-effective services to consumers and businesses and also maintain the European telecommunications industry at a competitive technological and commercial level.

The action program was adopted by the Council in December 1984 and implemented by the Commission assisted by a Senior Officials Group for Telecommunications (SOGT). It consists of senior officials from the [EC] Ministries of Industry and network operators. It pursues five objectives:

a) Establishment of a common development strategy for advanced networks.

The objective is to offer European business a broadband communications network permitting the interactive exchange of data, text, voice, and images by 1995. Until then the member states should coordinate installation of the intermediate stages of network digitization and establish large trans-border arteries by connecting sections of existing or planned communications "expressways".

b) Initiation of concrete short- and medium-term projects in the area of videocommunication (in progress) or communication between public offices;

c) Creation of a vast internal market by means of a new and accelerated standardization policy. In the case of telecommunications, this implies elaborating common specifications in areas linked to the establishment of advanced communications networks, favoring mutual recognition of tests and certifications by all PTT's, and a gradual opening of markets;

d) Increased attention to disadvantaged regions;

e) Establishment of common positions in international negotiations, particularly vis-a-vis Japanese or American initiatives in the telecommunications sector.

5. To promote mastery and dissemination of new technologies, notably through measures designed to create a favorable educational, intellectual, and cultural environment.

Training is a central issue in the current context of technological change, because it will be necessary to increase very rapidly the commitment to teaching and self-study for everybody, both in the area of general education and in training for new technologies.

The Community is developing two programs:

-- The DELTA program designed to use information and telecommunications technologies to improve the flexibility, accessibility, and cost-effectiveness ratio of training systems;

-- The COMMETT project designed to improve links between universities and industry to facilitate adjustment of the training system to new technological developments.

Moreover, a Community response seems indispensable to counter the problems posed by the development of audiovisual communication systems, for which European producers may not be able to provide the programming.

The Community will soon make proposals to create a solid developmental framework in the following fields:

-- Standards, with the adoption of a single family of common standards for direct-broadcast television;

-- Law (principles concerning freedom of broadcasting and reception, advertising, etc.);

-- Industry. First, in order to respond to the threat from program producers and avoid being invaded by audiovisual products made outside Europe which are inconsistent with the cultural identity of our continent. Second, in order to define a common strategy for the evolution from current television to that of the near future (high-definition TV).

6. To help the most disadvantaged regions use new technologies within an industrial context which is itself insufficiently developed.

Studies conducted by the Commission have indicated that the regions most disfavored by the Community show a significant lag both in telecommunications equipment and in services offered. In addition, because new equipment and services are installed in response to demand, the natural tendency is to concentrate these services in the central areas, which are also the most dynamic in the Community, at the expense of less developed peripheral regions.

The Community cannot accept this type of development. The Commission is of the opinion that new technological developments, rather than freezing existing economic structures, must serve as a means for disadvantaged regions

to participate in the qualitative leap which Europe is achieving in the telecommunications area. In this perspective, the Commission is proposing the Community program named STAR (Special Telecommunication Action for Regional Development Aims).

This program constitutes a new form of intervention by the European Regional Development Fund (ERDF) introduced in 1985. This regulation is new in the sense that it was designed by the Commission itself and not by the member states. The objective of STAR is to help the under-industrialized regions of the Community use new technologies in an under-developed industrial context and thus prevent regions from being excluded from the positive effects of the new Community policy on telecommunications.

The STAR program, which will permit better access to modern telecommunications services, provides for 700 million ECU in Community funding spread over 5 years (1986-1990). It is in keeping with the Community strategy of modernizing telecommunications by focusing on the coordinated implementation of networks, i.e., the gradual installation of integrated services digital networks (ISDN). In a second phase scheduled for 1995, attention will be paid to the installation of broadband networks.

STAR provides for the creation of modern equipment and for a coherent set of subsidies designed to stimulate supply and encourage demand for advanced services.

Because the program responds both to the objectives of regional policy and to Community guidelines for telecommunications, Community funding will reach the highest level normally provided for in ERDF regulations (up to 55 percent of total public expenditures).

The whole or part of ERDF aid may take the form of a capital subsidy or of reduced loan rates.

7. To assure close coordination between these activities and other EEC activities, market reactions, national programs, and intergovernmental initiatives taken in related or identical areas.

Prompted by the French and German governments, the EUREKA initiative seeks to promote industrial cooperation in technology involving market-related products and services.

The EUREKA project was proposed as a European reaction to the Strategic Defense Initiative. By focusing public and business attention on the need for European cooperation to counter the economic and political challenges of new technologies, EUREKA is an effort in Europe's best interest.

Certain questions, however, remain open and can only be effectively answered through close cooperation between EUREKA and the EEC.

If we want to put behind us the contradiction between scientific success and commercial failure in Europe, the success of technological initiatives will

require the creation of a favorable environment for the transfer and conversion of scientific discoveries into product innovations tailored to the market.

This calls for coordinated standards, dismantling state monopolies, new tax measures, permitting free competition, commercial solidarity vis-a-vis the outside world, etc., which are at the heart of the Treaty of Rome and of Community action. This course must, if necessary, be strengthened and broadened to non-Community countries.

However, human and financial resources being limited, it will be advisable to carefully oversee the complementarity of projects initiated within the two frameworks, which should be simple in principle because the same players are involved.

The Commission has signed the EUREKA declaration of principles, which states in particular that "the European Communities are allowed to join in EUREKA as partners, for example through their own research facilities, R&D programs, and financial resources." It is in this spirit that the Commission has already proposed joining certain projects.

The Commission is also interested in several EUREKA projects, such as those regarding advanced software technologies and the creation of a flexible factory for electronic boards, with due consideration of contracts already signed or being negotiated in these areas. Finally, the Commission has proposed the organization of an industrial forum on gallium arsenide technologies.

However, EUREKA project findings in civil technology can only be transferred by the industrial firms themselves depending on their commercial interests. It is well known that European business is handicapped, relative to its foreign competition, particularly in matters of taxation, venture capital, and links with universities. Here, too, political and economic measures are needed for which the correct institutional framework is the EEC. It is in this sense that the Commission is preparing proposals for financial management of venture capital which could benefit all European technology projects.

Finally, it will be advisable to avoid the usual tendency of complex, large-scale international projects, i.e., the creation of a new bureaucracy. In this respect, the decision to create only a light and flexible secretariat shows that this tendency has been avoided. Also, common sense calls for using existing Community services which have proved their value in international and intercompany technical cooperation.

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### FRANCE'S CNRS: CLOSER COLLABORATION WITH PRIVATE ENTERPRISE

Paris L'USINE NOUVELLE in French 24 Apr 86 p 46

[Article by Marc Chabreuil: "CNRS and Private Businesses: Partnership Is the Issue of the Day; first paragraph is L'USINE NOUVELLE introduction]

[Text] Creation of joint laboratories and a postdoctoral scholarship, establishment of multidisciplinary laboratories, launching of multipartner programs ... Pierre Papon, managing director of CNRS [National Center for Scientific Research], discloses the major themes of his policy of collaboration with private enterprise, exclusively for L'USINE NOUVELLE.

CNRS does not want to restrict itself to limited implementation activities and to signing overall agreements with manufacturers. "We intend to develop a true contract policy based on partnerships with companies," reveals Pierre Papon, CNRS managing director.

The first concrete manifestation of this intention is the proliferation of joint laboratories involving CNRS and private companies. "They enable industrialists to undertake more fundamental and longer-term research. Also they improve the researchers' chances of finding practical applications for their work," specifies Pierre Papon.

After a first experiment with Roussel-Uclaf 2 years ago, five such laboratories will be created this year. An agreement has recently been signed with Saint-Gobain: a true "crossroads laboratory" for advanced materials research for the whole group will be set up on the Pont-a-Mousson premises. The four others will be set up at Montpellier (Rhône-Poulenc) for inorganic chemistry, and at Lyon for catalysis (ELF [French Fuels and Lubricants] and IFP [French Petroleum Institute]) and agricultural chemistry (Rhône-Poulenc).

To limit the investments required by this type of laboratories, CNRS will encourage multipartner operations linking the sometimes competing industries and organizations around a joint research subject. "The European ESPRIT and EUREKA programs were successful at that, so why not do it in France? I will propose this formula to several businesses beginning with the materials field," confides Pierre Papon.

Another CNRS decision is the creation of multidisciplinary laboratories, a structure which will spare manufacturers the trouble of calling upon specialists scattered among different laboratories for a single problem. "This will no longer be necessary with the Federal Materials Institute of Nantes: It will incorporate five laboratories for chemistry, physics, and physical engineering. Other institutes will be created in fine chemistry in Montpellier, in social sciences, and, perhaps, in the physical chemistry of materials in Strasbourg," discloses Pierre Papon.

Although the chemistry and physical engineering laboratories maintain close contact with the industrial world, this is not the case for biotechnology, says Pierre Papon: "Despite definite progress, French laboratories are not yet capable of responding to the scientific and technical challenges of biotechnological applications in agronomy, in the agro-food industry, in pharmaceuticals... We have to reorganize our research before involving companies in projects of mutual interest." Likewise, the social sciences laboratories will have to "define a working methodology" in order to improve their response to the needs of the industrial services sector and, more generally, to the needs of the entire service sector.

#### Postdoctoral Scholarships Starting in 1987

Another flaw, this time at the national level, is the low percentage of engineers trained through research (less than 5 percent). In addition to increasing the number of doctoral scholarships, the CNRS will create postdoctoral scholarships by 1987 at the latest. "They will be granted to two young thesis holders who wish to start an industrial career. For 2 years the scholars will work in a laboratory to acquire high-level research experience in a scientific subject of value for the companies," specifies Pierre Papon. Their salary, practically equivalent to a starting salary, will be cofinanced by the companies, because today "manufacturers, who need internal as much as public research," seem ready to pay the fair price for this cooperation.

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### FORMER FRENCH MINISTER ON NEW R&D POLICY DANGERS

Paris LE MONDE in French 28 May 86 p 18

[Article by Jean-Pierre Chevenement, former minister of research and industry: "Abandoning Research"; first paragraph is LE MONDE introduction]

[Text] High-level research cannot develop in France or abroad without state aid.

In the directives recently addressed to his ministers for the preparation of the 1987 budget, Jacques Chirac indicated that the budget "must reflect the reduction of state involvement." The asserted intention is to "encourage stronger, healthier growth and create jobs."

The idea has been repeated a hundred times: By decreasing the burden of the infamous "compulsory advance deductions," companies would have the best possible control of the allocation of their resources. Thus, the best performing companies would be given a fair chance. It is quite rare that a generally accepted idea incorporates no truth at all, but it is also easy to show that there is something simplistic and therefore wrong in the liberal [as published] philosophy underlying the choices of this government. Indeed, nowadays worldwide competition involves a confrontation not only between companies but more fundamentally between entire economic and social systems. The case of research is particularly illustrative since it plays a decisive role in all modern economies and determines more and more who will win.

French research has just received a severe blow: For the first time since 1981, research credits in 1986 have gone down compared to the previous year (about 4 percent as opposed to an anticipated 4-percent volume increase). The cancellations of funds as indicated in the decree of 17 April 1986 primarily affect the research budget (half of these concern program authorizations; almost one-third relate to payment credits, totaling Fr 2.2 billion from a total of Fr 6 billion in canceled funding).

#### Business Needs the State

This is a regrettable choice. State expenditure on research, which stagnated at 1.8 percent of the gross national product throughout the 1970's, has grown steadily for the past 5 years, reaching 2.29 percent of the GNP in 1985. (Footnote 1) (Report attached to the 1986 appropriations law on the

condition of technological R&D) This was the highest level ever reached in France (the previous record dates back to General de Gaulle's era: 2.16 percent in 1967 compared to 1.15 percent in 1969). This recovery, which still left us behind the United States (2.73 percent in 1983), Japan (2.55 percent), and the FRG (2.57 percent), was indeed a policy objective of Francois Mitterand for 5 years in spite of his austerity measures. This policy has just been ruined.

Former President Pompidou is quoted as having said: "There are three ways to lose money: The most pleasant way is women; the fastest is gambling; and the surest is research." If the example of research is used as a criterion, political commentators are correct in speaking of a "return to Pompidou." It is now the same people as in the early 1970's who are making the same short-sighted choices, guided by pure budget management preoccupations. Those who were responsible for the historical decline of French research have returned.

Business needs the state. The state alone is able to maintain high-level fundamental research which is the condition not only for subsequent progress in applications, but also, more prosaically, for the way progress made abroad is received in our country.

In France research has only been able to develop with government assistance--this may be regretted, but it is a situation that cannot be changed overnight. The state provides 55 percent of civil research financing compared to 40 percent in the FRG, 37 percent in Japan, and 34 percent in the United States.

France's industrial research (about Fr 50 billion per year) is far behind its American (Fr 416 billion), Japanese (Fr 111 billion), and German (Fr 81 billion) counterparts, although an effort to catch up is evident: The money spent on research by companies compared to the gross production of sales sectors has gone up from 1.11 percent in 1980 to 1.26 percent in 1984. The increase in the amounts spent on research in national companies (5 percent in volume per year) has been particularly noticeable since 1982.

But this process of catching up is only possible with state aid, which contributes 22 percent of industrial research financing, i.e., Fr 12 billion per year. The historical underdevelopment of our industrial research and the small number of French companies with a research policy (only 1,300 companies employ more than one permanent researcher and about 100 employ more than 50!) make state intervention absolutely necessary. It is quite a paradox that precisely the funds allocated to industrial and technological research (those of ANVAR [National Agency for the Implementation of Research] and the Research and Technology Fund) are affected most.

The severe blow to the long-term industrial and technological policy, which was established in 1981, is very serious. Such a policy needs considerable time to bear fruit--the one instituted by General de Gaulle grew in vigor for 10 consecutive years (1958-1968). The effort begun at the beginning of Francois Mitterand's 7-year term has been halted at the halfway mark.

Is it not too early to pass such a categorical judgement? No! One only needs to compare payment credits and program authorization which have been canceled: Fr 200 million and Fr 400 million respectively for ANVAR, Fr 100 million and Fr 5.35 million respectively for the Research and Technology Fund. Such a steep decrease augurs ill for the 1987 budget! Alain Devaquet--who courageously defended CNRS [National Center for Scientific Research] and INSERM [National Institute for Health and Medical Research] against the UNI's ultras--will not be able to do anything against Chirac's budget directives. If Chirac is going to wait until the autumn for the right time to make some generous gifts, these will go to his clients rather than to research. Likewise, the abolishment of the Ministry of Research and Technology which I created in 1981 will result in depriving France of the "Ministry of the Future" which Francois Mitterand specifically wanted for this country.

I do not criticize the reunion of research and higher education on principle. It might have been welcome some day. Today it indicates a dangerous step backwards: The policy of establishing closer links between research and industry carried out in the wake of the research and technology colloquium (1982) has not yet had the time to produce all the effects expected: such as the implementation of research in the large organizations authorized to create "public interest groups" and subsidiaries, or researcher mobility toward companies, or the creation of regional technology centers associating industry with the university.

Research has too much of a tendency to retire within its own shell into a kind of splendid ivory tower. The reunion of research and higher education implies a great danger of "academic regression": It shows the narrow and in fact reactionary attitude of the small number senior officials who, for purely ideological reasons, have succeeded in imposing their views and in frustrating the movement toward a rapprochement of research and industry which the Left had expressly wanted.

The end of the Ministry of Research and Technology deprives research of the powerful advocate it needs to defend its budget interests within the government. The breakup of the research community and the scattering of financing among several ministries will prevent a coherent civil R&D budget from being able to establish research programs which transcend organizational borders. The end of the MRT is also the victory of the Reu de Rivoli offices [Ministry of Finance]. Only a powerful and freely moving "Ministry of the Future" is able to produce an impulse strong enough to overcome the two conservatisms which weigh so heavily on both the university and the employers' world.

#### On the Way to Underdevelopment

For a number of years now it has been considered good form to malign "Colbertism" [etatism]. I always thought that it implied a total lack of understanding for France. In France (and even abroad) both the development of high-level research and the great technological breakthroughs (the atom, aeronautics, space, electronics) are entirely due to the state. Once the breakthrough is achieved, the problem lies in transferring it to business. This passing of the baton should be organized.

It is as if the leaders of the Right, having become contemptuous of the state while in the opposition, have now left the means for national recovery in the hands of industrial management, which, as they well know, left to its own devices, is not ready to pick up the gauntlet.

The return of the conservatives also means the return of conservatisms in research as well as in industry. It poses the problem of knowing whether France is capable--or not--of taking the "intellectual step," in short to make the continuing effort for intellectual, scientific, and technological investment which will determine its national survival. The choices made in less than 60 days sufficiently show that the return of conservatism, if continued, will put France on the way to underdevelopment. Reduction of state involvement in research is, in the current economic world war, equal to unilateral disarmament!

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### DETAILS OF FRG, USSR S&T AGREEMENT, BERLIN SOLUTION ANTICIPATED

#### Soviet Agreement Detailed

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 23 Jul 86, pp 1, 2

[Article by "C. G.": "Genscher, Riesenhuber Sign Science and Technology Agreement in Moscow"]

[Text] Moscow, 22 July--Foreign Minister Genscher and Minister for Research Riesenhuber signed a government agreement with the Soviet Union on the exchange of science and technology in Moscow on 22 July. Negotiations on such an agreement which started in 1973 have long been unsuccessful because of Moscow's opposition to the inclusion of Berlin. Negotiations between German and Soviet officials during the past 2 weeks have now reached agreement on an "individual solution" with regard to the naming of members of the federally operated institutes located in Berlin.

The agreement, which was signed by Foreign Minister Shevardnadze and the deputy chairman of the State Committee for Science and Technology, Yefremov, on behalf of the Soviet Union serves as the framework for three separate agreements, i.e. on cooperation in the peaceful uses of nuclear energy, on health policy and on agriculture. Riesenhuber initialed the nuclear agreement and officials of the ministry for agriculture and the ministry of health initialed the other two agreements. All three agreements are to be formally signed by Riesenhuber, Kiechle and Ms Suessmuth, the respective cabinet ministers, at a later date. Only then will all the agreements go into effect. This is the first German-Soviet treaty in many years and it is expected to "act as a pilot" for additional agreements between the FRG and the Soviet Union as well as the GDR.

In each of the three areas identified in the separate agreements an agreement was reached on joint projects and appended to the basic agreement. Each of these project agreements contains various areas of cooperation and for each project those who will take part in it are already named. There are 15 such themes, unevenly divided among the three main areas. The project agreements are to run for 2 years.

Both the basic agreement, which has initially been projected to run for 5 years and the three specific agreements contain the so-called Frank-Falin proviso which states that the respective "agreement is extended to Berlin (West) in keeping with agreed upon procedures in accordance with the Four Power Agreement of 3 September 1971." The project agreements do not contain a master clause. The latter agreements specify that the names of the scientists taking part in the individual projects will be listed together with the institutes they represent whether these are Land facilities--which also applies to Berlin--or federally operated institutes in Western Germany. The procedure is different in the case of Berlin members of federal institutions. They are cited by name followed by a comma. After the comma, instead of listing the name of the institute they represent, the number of a post office box, followed by the designation "Berlin (West)," is given. The post office box--and this is not contained in the text of the agreement--will have to be newly rented by the institutes concerned.

In this way, only two members of federally operated institutes located in Berlin have been named thus far: one who represents the material testing office and another who represents the government public health office. These two will take part in projects relating to nuclear cooperation and public health. No corresponding arrangement is contained in the project agreement on agriculture.

A joint memorandum for the record was also signed in Moscow on 22 July by the political director of the Bonn foreign ministry, von Braunmuehl, and the head of the 3d European department of the Soviet foreign ministry, Bondarenko. These 15 lines of text ultimately enabled the Bonn delegation to conclude the overall agreement. What the note says is that three agreements have been reached, i.e. that in two of the areas "the individually named [ad personam] participants will take part immediately" and in the third area this will "take place during a second stage." The words "ad personam participants" refer to the Berliners and the third area of joint projects refers to agriculture in which a Berlin representative is to take part in 2 years so that the entire area of agricultural cooperation will not remain closed to federally operated institutes in Berlin indefinitely.

The memorandum also contains an agreement by the two sides to the effect that "negotiations aimed at the conclusion of an environmental protection agreement will be initiated." With special emphasis on the Berlin federal environmental agency the memorandum then goes on to say: "Analogous to the above statement, an ad personam participant will take part in this during the first stage." The aim is to include agreement on a fourth area, i.e. the environment, in the overall agreement and to include a representative of the environmental agency in the first project to be undertaken. The text of the basic agreement just signed already cites environmental protection as one of the areas of cooperation in science and technology.

Until the evening of 18 July, Bonn insisted on a 3:0 solution, i.e. one which would have included representatives of the federally operated institutions in Berlin in each of the three project areas--not excluding agriculture. For its part, Moscow insisted that one of the three areas be excluded so as not to stipulate an "automatic" participation by Berlin representatives from the start. The opposing Bonn view was that there should not be a "negatively automatic" exclusion of a subject area from the "ad personam solution" minus the institute address. The declarations of intent contained in the memorandum for the record offered a way out. But translation difficulties made it necessary to prolong the negotiations until 22 July.

According to Bonn diplomatic sources, a Berlin solution has now "been worked out pragmatically in the abstract." This is another way of saying that as of now only two Berlin representatives will be taking part in the projects for the time being and that the delegation did not succeed in having the Berlin federal agencies cited by name. Genscher maintains that the planned inclusion of a representative of the environmental agency is a success in that officials of that agency were not even listed by name in the list of delegates to the Munich environmental conference in 1984. In the cultural agreement with the GDR, which was initiated by the chancellor's office, Berlin theaters were included in the exchanges; but there was a failure from the start to arrange for participation by one of the three federal cultural institutions in Berlin, e.g. the archeological institute, in the exchange program.

The basic agreement cites the exchange of information as the form of scientific-technological cooperation. This includes the organization and execution of symposia, conferences, training programs and exhibits. There are plans for the exchange of technical delegations, scientists and other personnel and the exchange of experts for scientific-technological consultation. The agreement also serves to coordinate research projects and joint activities in the field of basic and applied research. This includes mutual preparation of research materials and the supply of scientific equipment and appliances. Another section of the agreement deals with joint research and development of new technological processes as well as ways to apply these processes in production. Cooperation "on the basis of equality, mutuality and mutual advantage" is to be regulated by the ministries or by organizations designated by them by means of technical agreements yet to be concluded. The areas which such agreements might cover are: nuclear research and the peaceful uses of nuclear energy; energy technology; exploration and utilization of outer space; biology and biotechnology; data processing, information and documentation; research and technological development in transportation, in agriculture and environmental protection; medical research, educational research and specific projects in mechanical engineering, metallurgy, electronics, computer technology and chemistry.

A mixed commission to help implement the agreements is being formed, analogous to the existing mixed economic commissions. Third countries may be provided with joint data only by mutual agreement. According to an addendum to the agreement, necessary travel by scientific personnel shall be subsidized and materials shall be exempted from customs duty "insofar as possible." The Frank-Falin Berlin proviso is contained in article 9 of the basic agreement.

#### Gratified and Contented

[Article by "J1": "Satisfaction and Contentment"]

[Text] Bonn, 22 July--Initial Bonn reaction to the agreement on German-Soviet cooperation in the field of science and technology signed in Moscow has been marked by gratification and contentment. Although the Bonn government is not calling it a "breakthrough," circles close to the government are saying that Bonn feels above all that its efforts to include the Berlin scientific-technological potential in the agreement have been successful.

#### Complicated Berlin Rules

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 24 Jul 86 p 4

[Article by Peter Jochen Winters: "Aftermath of Moscow Agreement: East Berlin Agreement Not Far Off"]

[Text] Berlin, 23 July--In all likelihood, elation over the conclusion of the scientific-technological cooperation agreement between the FRG and Moscow was no greater anywhere than in East Berlin. In the recent past, the GDR has made it increasingly clear that it has great interest in scientific-technological exchanges with the FRG. It hopes to achieve substantial gains in scientific and technological know-how through cooperation in this field. The vital interest of the GDR in Western know-how is based on the fact that it is only with the help of such know-how that its economy will be able to meet the ambitious commitments it has entered. The greater contribution of the GDR to the development and modernization of the Soviet economy asked for by Gorbachev also calls for closer scientific-technological exchanges between the GDR and the West and the FRG in particular.

As far back as 1972, the basic agreement between the two German states contained a declaration of intent calling for an agreement on cooperation in science and technology--and on 30 November 1973 negotiations on just such an agreement did begin in Bonn. Ever since then, over the past more than 12 years, negotiations have been going on alternately in Bonn and East Berlin. The delegations are still headed by the same two men: State Secretary Haunschild of the ministry for research and technology for the

FRG and State Secretary Leupold of the ministry for science and technology, for the GDR. The last time the two delegations met was at the end of April in East Berlin. It was their 32d meeting.

The negotiations on a science agreement between Bonn and East Berlin had started off at a rapid pace and had made good progress. The first session on 30 November 1973 was followed by six sessions each during 1974 and 1975. But once the 12th round of negotiations was over, it became clear to the leader of the Bonn delegation that the conclusion of a science agreement between the two German states could not be expected until agreement on a similar understanding with the Soviet Union had been reached. The fact is that the FRG has also been negotiating with Moscow on a scientific-technological cooperation agreement since 1973. In both negotiations, it was the inclusion of Berlin on which no agreement could be reached. Referring to the unresolved issue of the inclusion of Berlin in the projected intra-German science agreement, State Secretary Haunschild said in a news agency interview as far back as 1975 that it was "clear and logical from a political point of view" that agreement on this point would first have to be reached with the Soviet Union, as one of the signatories of the Four-Power Agreement. Only then would it be possible to conclude a similar agreement with the GDR--and that realization remained valid until today.

This, in effect, had put the intra-German science agreement on hold. Still, negotiations between Bonn and East Berlin were not broken off. In 1976, the delegations met three times; in 1977, they even met five times and in 1978, they met twice. By that time, the main points of the agreement had been worked out. Scientific-technological exchanges were to take place in the fields of medicine, medical technology, reactor safety and environmental research as well as in basic research generally including the liberal arts and social sciences. Agreement was also reached on including Berlin on the basis of the so-called Frank-Falin formula. But in a practical situation, this formula, i.e. "this agreement is extended to Berlin (West) in keeping with agreed upon procedures in accordance with the Four-Power Agreement of 3 September 1971," does not really work. This became plain when the German-Soviet cultural agreement was concluded in 1973, which also contains the Frank-Falin formula. This agreement has not gone into effect because not a single one of the projected 2-year plans calling for concrete projects has been implemented. Thus far, the Soviet Union has refused to allow federal institutions located in Berlin, e.g. the Prussian Cultural Property Foundation, to be included in the cultural exchange program.

In the field of scientific-technological exchanges both with the Soviet Union and the GDR, the goal is to include federal institutions located in Berlin such as the Public Health Agency, the Environmental Agency, the Material Testing Office or the Biological Agency for Agriculture and Forestry in Berlin and Braunschweig. In the Soviet view, federal institutions headquartered in Berlin are there "illegally" because, according to the Four-Power Agreement, West Berlin is not a constituent part of the

FRG and may not be governed by it. This is the reason why the Soviet Union refuses to include federal institutions located in Berlin in any agreements. With regard to scientific-technological exchanges, an understanding has now been reached at the signing of the science agreement in Moscow on the basis of the so-called "ad personam" solution which specifies that the project agreements on exchanges in the various fields shall list the names of the individual participating scientists. In addition to the scientist himself, the name of the institution at which he works shall be included in the listing, if it happens to be a federal institution located in Western Germany or a Land institution which includes Berlin. In the case of scientists who work at federal institutes located in Berlin, the name of the institute will not be listed. Instead, there will be a listing of a post office box and the notation "Berlin-West." This "ad personam" solution had already been the subject of discussions between Bonn and Moscow in the second half of the seventies. But at that time, no agreement was reached.

As far as the intra-German negotiations on a scientific-technological cooperation agreement are concerned, lengthy intervals between sessions began appearing after the 23d meeting in June 1978. The next round of negotiations did not take place until November 1979 and the 25th anniversary meeting between state secretaries Haunschild and Leupold was not held until October 1980. Between 1981 and 1984, only one meeting was held each year. Last year, the two delegations met twice. By then, Moscow and Bonn had resumed negotiations on a scientific-technological cooperation agreement between the two countries.

Now that the German-Soviet agreement has been signed, it will probably not be very long before state secretaries Haunschild and Leupold will meet once more and bring their negotiations to a close so that the intra-German science agreement may be signed. There is no reason to expect the two heads of delegation to reach an agreement on the inclusion of federal institutions located in Berlin which differs from the one just signed in Moscow.

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ITALIAN RESEARCH CENTER DEVELOPS EXPERT SYSTEMS FOR INDUSTRY

Milan L'ELETTROTECNICA in Italian No. 4, Apr 86 pp 363-364

[Excerpts] It is well known that "expert systems" represent, so far, the only important development in that wide area of information activity known by the fascinating name of artificial intelligence.

During recent years, CISE [Center for Information, Studies, and Experiences] has gained some experience in developing expert systems for diagnostics in systems and complex equipment as well as in the optimization of plant design. Within the framework of research orders from ENEL [National Electric Energy Agency], ENEA [National Committee for Research and Development of Nuclear Energy and Alternative Energy], and the EEC Esprit program, CISE has also engaged in the following projects:

--Control and diagnostics system for pollutants in fluids of the thermal cycle process of thermoelectric power plants.

This expert system is expected to recognize the presence of pollutants, identify their origin on the basis of water conductivity measurements in various plant locations, and thereby provide correction procedures to the operator.

--Expert system for the diagnosis of faults in a turboalternator group.

The periodic analysis of vibration data of the turboalternator group allows the detection of small faults with the potential of becoming serious.

--Pilot project of an interactive system for the definition of the optimal configuration of electronic equipment.

The aim of this project is to develop a configuring method for computerized control systems of primary transformer rooms.

--Study project on the time dependence and modeling of physical systems in the application of expert systems to the supervision of industrial processes.

This study (developed within the Esprit framework) will analyze some of the research topics emerging from the application of expert systems to the diagnosis and monitoring and control of plants, equipment, and industrial processes.

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## WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

### ESPRIT, EUREKA, RACE, COCOM ACTIVITIES UPDATE

Turin MEDIA DUEMILA in Italian No 30, Apr 86 pp 87-88

[Article by Giampiero Gramaglia: "New Esprit-Linked Project;" first paragraph is MEDIA DUEMILA summary heading]

[Text] Three Italian projects. In June, London, a meeting on the "Eureka" program. "Race" pilot-phase is starting.

Brussels.

"Esprit," the ECC's microelectronics-developing program, is financing 11 new projects in the software field, which are the best of 40 projects bid on in last autumn's extraordinarily competitive examination. (All of them have been judged as having "high quality" by a group of independent experts.) The projects necessarily had to be selected and reduced from 40 to 11 because of the scarcity of available funds: an EEC economic contribution of 18.9 million ECU, over 27 billion lire, has been provided to cover only half of the research expenses (the remaining half must be paid by the enterprises and research centers participating in these projects.)

According to Karl-Heinz Narjes, vice-chairman of the European committee in charge of research and industry departments, the whole software field of the Esprit program provides (through this action) a possibility to improve the products' quality and the European industry productivity.

Italy takes part in 3 projects out of 11: "Delphi" is participating with British and French companies as well as Bath University in a research program named "Chameleon" (Dynamic software migration between cooperating environments); "Enidata" is participating with French companies and German and Greek research centers in a research program named SED-SETL, experimentation and demonstrator; "Csata" is participating with French, Danish and Spanish firms in a research program named SFINX, Software Factory Integration and Experimentation.

London

The organization of the June meeting in London of the ministers whose countries participate in the "Eureka" program, which is, in a certain sense,

the European response to SDI, the U.S. Strategic Defense Initiative, is going on at an accelerated pace, through meetings of experts and officials. At the same time Belgium officially proposed Brussels as a seat of the new organization's permanent secretariat.

The European Trade Union Federation [CES] proposed that the "Eureka" program should deal with non-military research only and be complementary to the research programs the European Community carries out. Moreover CES wants workers to have an "active role" and be "informed and consulted" whenever technological changes are to be started.

The London meeting in June is likely to give a green light to 16 new projects that will be added to 10 other projects launched in November in Hannover. The 16 new projects, among other things, concern new materials for engines, the aerospace industry, detection of vehicles noise sources, computer-aided medical diagnosis, dispersal chemical wastes, expert systems, advanced software, integrated circuits, third generation robots and so on.

#### Brussels

The pilot-phase of the "Race" program, the EEC's program for telecommunications, had a good start, with the launching of 31 projects (for a total expenditure of 40 million ECU, amounting to as much as 60 billion lire). They have been carefully selected by the managing committee of the program in which administration representatives of the "Twelve" participate.

The European committee, which is the Community executive committee, is of the opinion that such projects enable Europe to lay the foundations of the 21st century telecommunications systems. All the contracts have already been drawn up and many of them have been signed and put into execution. The EEC will share 50 percent of the costs.

#### Strasbourg

By adopting unanimously a resolution that Dutch socialist Alman Metten presented to the Assembly, the European Parliament has declared its opposition to unilateral controls on technology transfers by the United States (such controls are to be added to those of Cocom, the organization regulating exports from West to East).

The European Parliamentary Assembly believes that such an attitude is limiting in substance, the European access to U.S. technology. In his resolution Metten also suggests to the European Committee that it should determine the compatibility of Cocom's regulations with the EEC ones and that the "Twelve" should take the initiative in modifying Cocom procedures.

But, at the same time, the European Parliament acknowledges that a European Community having the capability to compete technologically with U.S. and Japanese product-lines would be the best guarantee to avoid unilateral controls on technology transfers by the United States.

Brussels

In the European Community member countries there are remarkable differences in home computer prices, but consumers have many problems in taking advantage of the situation because of the existing difficulties in having guarantees respected outside the country where the computer has been bought.

This is the result of a survey the office in Brussels of the European Consumers Association (BEUC) has carried out. According to the survey VAT rates differences do not account sufficiently for computer price differences among EEC countries, but such differences rather originate from the producers attempt to create barriers between the single national markets. In this way Germany and the Netherlands, major home computer producers, have the cheapest prices; Ireland and Denmark have prices one-quarter or one-third higher and Greece even one-half higher. BEUC's survey doesn't consider Italy.

Brussels

To keep the overall picture of technological and scientific knowledge complete and up-to-date; to promote demand in Europe, arising from innovation mainly related to major projects; to foster European supply capability; this is a three-pronged strategy that should enable the industry of the "Twelve" to respond effectively to the U.S. and Japanese challenge in the forefront of information technologies.

Based on a set of recommendations which the Council of Ministers of the "Twelve" and the European committee are examining, this strategy has been drawn up by the EEC's Economic and Social Committee (CES), which is the consultative committee of the European Community representing all the producing classes and consumers, following a report by the Italian official Romolo Arena of the employer group.

Arena's report is a part of the CES's three-part set of recommendations. The remaining two parts are relating to the social aspects of new technologies and relations between new technologies and the European Community's research and development programs.

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CSO: 3698/M122

BRIEFS

RACE COMMUNICATIONS PROJECT--The RACE [R&D in Advanced Communication Technologies for Europe] program has demonstrated the EEC's interest in studying a standardized network for transmission of all kinds of digitized information. Cryptech will play an important role in this context. Data transmission poses inevitable security problems. For integrated broadband communications, Cryptech, an Intersys subsidiary, has recently been selected by the EEC in the framework of the RACE program, which is 50 percent financed by the EEC. This is certainly a testimonial for this young Brussels enterprise. But there is more to it than that. It is also conducting research for a project of CIRI, the Interbank Data Processing Research Center. This institution, which includes all the large financial institutions in Belgium, has a major concern: adding an electronic signature to transactions to guarantee the principal's identity and his authorization for such a transaction. This is the TRASEC program, which Cryptech will supervise. [Excerpt] [Paris ZERO UN INFORMATION BELGIUM in French and Dutch 14 Apr 86 p 4] 25006

## WEST EUROPE/TECHNOLOGY TRANSFER

### SWEDISH S&T PARKS: 1990'S HOPE

Stockholm SVENSKA DAGBLADET in Swedish 13 Apr 86 p 1

[Article by Gunilla Westerberg]

[Text] "During the nineties we will harvest the fruits of our investments in research cities and of the innovative climate that is developing within our companies."

That was stated by the executive vice president of Perstorp, Karl-Erik Sahlberg. At the same time, however, he admitted that his interpretation of the current trend was optimistic.

Recently, when the Swedish Employment Security Council presented its Idea Awards to inventors and entrepreneurs, Karl-Erik Sahlberg was invited to speak about how his company had successfully created an innovative climate.

He arrived at Perstorp in the mid-seventies and began making radical changes in the structure of the company. The goal was to make Perstorp a spearhead in its field. The business aspect was formulated by the concept "creative chemistry." The culture of the company was based on five key words:

- Specialization;
- Internationalization;
- Decentralization;
- Flexibility;
- Creativity.

#### Simple Signals

"We needed some simple signals that could be understood at all levels," said Karl-Erik Sahlberg. "A company is actually the people who do the work. If you want to rejuvenate a company, you must make changes in the people."

Perstorp is a small company by international standards. The best chance to survive is to be best in a narrow field. The company must be in charge of a certain little niche throughout the world. Perstorp has 80 percent of its activities outside of Sweden.

Decentralized responsibility and decision-making are necessary requirements for meeting the challenge, according to Karl-Erik Sahlberg.

"Many people believe that this results in chaos and a lack of control and that it is much more expensive. But I have never experienced anything but the opposite," he said.

#### Efficiency Increases

The individual worker who is allowed to make decisions himself can clearly see the results of his work and he can work on several tasks at once. Efficiency increases sharply. This is shown, especially, by the increased profits that can be seen in Perstorp's annual reports for the years following decentralization.

"The major changes that will be made in the future will affect white-collar workers," said Karl-Erik Sahlberg. The administration, too, will be made more efficient.

Perstorp has eliminated all central administration except for minor staff functions. All other salaried employees work out in the field with the companies that sell services to their customers--the 80 units where the development and production actually occur.

#### Limit Bureaucracy

Bureaucracy must be limited in order to achieve the goal of flexibility. To compete with companies that gross between 100 and 140 billion annually, little Perstorp, with its gross sales of 4 billion, must run faster than the others.

And then there is creativity--the creation of new products.

Perstorp has decentralized its R&D (Research and Development) work. For the past 25 years the company has had an internal research foundation that provides money for the development of ideas. The executive vice president administers a fund from which he can provide money directly to an employee who wants to try out an idea. The employee is not obliged to repay this money. Perstorp is working with research cities such as Ideon in Lund and for 12 years the risk-capital company Pernovo has provided economic support for various projects.

#### Encouragement

Karl-Erik Sahlberg summarized his experience as follows.

"Let as many people as possible take responsibility for some area. Everyone must be able to measure his work. Encouragement and motivation are decisive. The corporate management must provide continuing support and tell the personnel it is good that they are coming up with new ideas."

"The boss must be extremely magnanimous when it comes to correcting wrong decisions. Ten mistakes can be compensated by nine good initiatives. No one should be branded a failure for an unsuccessful effort made in good faith."

"Management must create a framework that everyone understands and refrain from establishing more and more detailed regulations."

Karl-Erik Sahlberg believes that the future of Swedish companies is found in cooperation--large companies providing personnel and knowledge to small companies that have ideas.

This is how new companies are created.

PHOTO CAPTION

1. p 1. Perstorp has decentralized as much as possible. The basic idea of Karl-Erik Sahlberg, executive vice president, is as follows: Let as many people as possible have responsibility for a certain area. Everyone must be able to measure his work. Encouragement and motivation from management are decisive in creating a climate of innovation.

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## WEST EUROPE/TECHNOLOGY TRANSFER

### FRENCH TECHNOLOGY PARKS ATTRACT FOREIGN FIRMS

#### Foreign Investors Welcomed

Munich SUEDEDEUTSCHE ZEITUNG in German 18 Jun 86 pp 35-38

[Article by Pierre Mehaignerie, minister of urban planning, housing and transportation: "Open for Everyone--Today Foreign Investors Are Fully Accepted in France"]

[Text] Today regional assistance in France pursues a double goal: to establish a better balance between the more or less naturally favored parts of the country and to make optimum use of all available local resources. This includes not only the economic but also the technical-scientific and cultural potential of a region.

In this connection, the creation of new jobs by French and non-French enterprises plays a central role. In particular, the investments of guest firms, which now create between 10,000 and 13,000 new jobs in France annually, represent a valuable instrument of regional development.

It was not always that way. In the 1960's and early 1970's, when the French domestic product was still growing by about 8 percent annually, the large-scale projects of regional support originated mainly at the initiative of domestic concerns; the contribution of foreign investments was then rather marginal.

Several years ago, however, this situation changed fundamentally. In the course of the rationalization and modernization of their work and structure, the French enterprises are tending to reduce the number of jobs and are even closing entire plants and frequently seeking opportunities in the world markets through increased foreign investment of their own.

In this country, therefore, regional support can hardly count any longer on additional jobs from domestic concerns. It therefore had to set three new goals for itself:

--helping middle-class enterprises modernize and expand;

--starting new enterprises as quickly as possible at traditional and new industrial sites;

--getting foreign guest firms to establish themselves in France, even if it is neither to be expected nor necessarily desired that they will solve all of the economic problems of the affected regions.

But its contribution to the future development of France is nevertheless welcome and is extremely well appreciated by us. I am thereby thinking not only of the creation of jobs but also of their contribution to improving exports and the results in the balance of payments, regardless of whether it involves German and Austrian guest firms or enterprises from Scandinavia, Japan and the United States.

I am also thinking of its equally valuable contribution to the transfer of technology to France and to the introduction of more efficient and profitable management methods. In this regard, let me give just one example from the western part of our country, where I was elected to public offices several times and for 20 years was therefore involved with and familiar with regional political problems and the positive effect of foreign investments.

In Brittany, the Japanese firm Canon set up a new plant that is to employ a total of 300 workers. In addition, the factory will acquaint an army of suppliers with new technologies, new forms of organization, new logistical methods, and even with a new work mentality. This influence is all the more welcome in that the suppliers in Brittany will thereby learn to look beyond the horizon of their region and consequently in the future will be able to place themselves better in the national or possibly even international market.

To promote and encourage such development, we ourselves have already taken a number of initiatives or are just now introducing them. Since the guest firms are fortunately establishing themselves in especially large numbers in precisely those regions that are at the very top of our list of priorities--the peripheral zones in the north, east, west and southwest--one initiative that could be named is the work of special development and finance companies in all these regions. They help foreign investors in every way in getting established.

Another measure that I would like to mention is the relaxation and acceleration of the approval procedures for foreign investments. It not only is of practical importance for the guest firms but also reflects a fundamentally new understanding for their work in France.

Finally, an essential point that I would like to emphasize is the fact that regional support here in our country does not affect the freedom of the enterprises to make decisions. Regional support in France prescribes nothing, it merely proposes and the enterprise management orders what it considers opportune. To bring the desires and needs of the investor in line with the

priorities of regional support, however, the responsible agencies (DATAR) and their branch offices in the separate parts of the country can also offer financial aid as an additional incentive.

Today, with my overall responsibility for regional support, I hope and desire that this policy can be further developed in two directions:

--The interplay of priorities and financial aid should be further refined so as to be able to meet the needs of guest firms even more flexibly and specifically. I have therefore entrusted a group of experts with submitting the appropriate proposals to me as soon as possible.

--We must do a better job of illustrating the changed image of our country and its industry to our neighbors and trade partners. In the Europe of the 12, France has a privileged geographic position, a modern infrastructure, and technical equipment. Its standard of living, the capability of its people, and the productivity of its economy are above the European average. In my opinion, however, it is precisely foreign industry that still does not properly recognize this fact everywhere.

France has thereby achieved creative peak performance in transportation, energy and space technology, for example, and is continuing to push the development of these and other key industries of tomorrow. In the future as well, I would like to do all I can for this France within the group of our international trading partners.

Lorraine's New Offer: Technology of the 21st Century in Europe's Three-Country Corner

At the top of the sign, one can still read the word "Walzwerk" [rolling mill] in faded letters. But someone has crossed it out with chalk and applied the colorful sticker "Europdress" underneath it. A clothing factory was the first new tenant to move into the administrative building of the closed Lorraine plant.

The change in the industrial structure can hardly be documented more succinctly, especially since the plaque is at the entrance to an extensive tract of land that could be of enormous importance for the industrial future of about 300,000 people: the European Development Pole (PED) in the three-country corner before the gates of the old mining and smelting city of Longwy.

In the course of the coming years, France, Belgium and Luxembourg want to restore about 400 hectares of settlement area here for the needs of European industry in the 21st century. "For this purpose, the governments decided on a joint action program as early as last year, in the course of which the region's infrastructure, services offered and possibilities for training are to undergo lasting improvement," explains Daniel Leloup, director of the development company Solidor in Longwy.

Thus the governments are planning the development of the existing railroad and highway networks as well as the modernization of the telecommunications

services including the setting up of satellite receiving stations and the laying of glass-fiber networks. Several buildings should accommodate joint services such as information and consultation services for firms that have already become established or are willing to do so as well as for banks, hotels, restaurants and mess operations, post offices, travel agencies, libraries and data banks.

To be sure, there are more than enough obstacles in the way of this beautiful new world. In the first place, the industrial sites of the PED must be consolidated through the expenditure of millions, for almost everywhere the area planners of the three countries are still running up against the neglected factory buildings of previous decades, ominous slag heaps and open ditches for industrial sewage. And in part, political opposition is arising in the affected communities and departments against the total dismantling of traditional industrial sectors, from which there is a fear of a likely increase in the short term in the already distressing unemployment in Lorraine, the southeast of Belgium and the southern part of the grand duchy: Longwy alone lost one-fourth of its previous jobs in the last decade.

In addition, the PED will have neither a unified budget nor a centralized administration but only a permanent coordinating committee made up of representatives of the three countries. That probably will not exactly accelerate the flow of decisions in the everyday operations of the project. In financial terms, however, the initiators of the plan expect something from the pending approval of their application to the EEC Commission in Brussels. It is to grant a special bonus system for firms that are willing to establish themselves. The direct financial aid would thereby be raised to a common level for all three countries and half of it would be borne by Brussels.

To be sure, Francis Cuillier, director of the interministerial French delegation for the PED, tries to play down the importance of financial aid for the Lorraine area planning with the demand: "We naturally want true entrepreneurs and not collectors of subsidies." But regardless of whether in the form of establishment bonuses or as massive advance payments by the involved communities, regions and countries for the renewal of the infrastructure, the ambitious project in the three-country corner of the EEC would probably scarcely get off the ground without a strong financial push by the state.

The necessity of such a push is clear to the responsible officials in all of Lorraine. "Whoever governs in France today must pursue a supply-oriented policy that makes its industry competitive internationally and that makes the country itself credible as an industrial site," stresses Jean-Marie Rausch, mayor of Metz, for example. Rausch follows up his words with deeds. In 1986, the city will invest about 20 million francs in its "Metz 2000" technology park. Among others, Apple Computer has set up its European software center there. Others setting up in business in the park are Thomson-Answare, Bull-Transac and Hewlett-Packard. For its part, the French Government moved the technical college for electrical engineering (Supelec) to Metz.

Rausch, who directs the Working Group for Computer Science and Telecommunications in the Paris Senate, would very much like to make his city

Europe's leading software production site and is not afraid to involve himself personally in explaining the advantages of the Metz site to interested parties on trips. His wish and dream: after the possible conversion of French telecommunications to private ownership, to be able to establish a "Teleport" in Metz as part of the infrastructure for the software firms, linking them with their headquarters throughout the world.

So much ambition and enthusiasm on the part of the city mayor naturally mobilize other communities of Lorraine for increased site competition. Nancy, for example, about 50 kilometers away and about half again as large as Metz in terms of population, thinks that it is by no means worse off than Metz. After all, its technology park Brabois, founded in 1979, is among the oldest and best-developed installations of this type in France. Today it is almost a distinct but fully integrated quarter of Nancy provided with all municipal infrastructural facilities.

The French state research center (CNRS), the Lorraine polytechnic school (INPL), various departments of the University of Nancy, and an interregional computer center form the academic or scientific-technical antipole to the industrial activity in Brabois. This activity ranges from the semiconductor plant of the Thomson concern in nearby Maxeville to the CAD/CAM developments of the U.S. Computervision firms to newly founded local firms such as Sefam, which produces 1.6 million francs in electromedical equipment with eight employees.

The industrial application of scientific-technical ideas--heretofore a typical weakness of the French economy--should therefore be among the main tasks of a technology evaluation center (CAT) that specialists like Swarc have longed demanded for Nancy and Brabois. The more industrial impulses emanate from the Lorraine technology parks and the more guest firms recognize and actively avail themselves of their opportunities in the research and development centers of this region in the heart of the EEC, then the more will not only the French economy profit from it but all of Europe will play a more dynamic role in international competition.

#### Where in Alsace Money and Ideas Gush Forth--The Border Region Is Betting on Technical-Industrial Cooperation

For years, the neighboring Lorraine had to fight against its reputation of having an environment damaged by industry and a social climate rocked by conflict. In Alsace, on the other hand, life is simply too good--not just in the opinion of many German observers--for it to be possible that a particularly large amount of work is being done there. Francois Loos, former innovation adviser of Strassbourg mayor Marcel Rudloff and now in a similar function with a large French industrial concern, jokes: "We would like to be Silicon Valley but are still considered to be just Sauerkraut Valley."

But the forests and castles, vineyards and meat dishes of Alsace merely obstruct the view of quite a different reality: in the past 25 years, an ultramodern and widely diversified industrial landscape came into being between the Rhine and the Vosges, between the Palatinate Forest and the Swiss border. Here are automobile plants and pharmaceutical laboratories, foundries

stand next to textile mills, and ball bearings and premium beers are produced practically wall to wall.

Non-French enterprises represent more than one-third of all newly founded firms in Alsace and the 170 guest firms of the region know only too well why they are deciding in favor of this location: 70 percent of the purchasing power of the Common Market is concentrated within a radius of 800 kilometers around Strassbourg.

By the same token, the strong international interlocking of Alsace can be seen in the fact that the value of its exports per capita is twice the French average.

But even such a successful and favored region as this area in central Europe cannot rest on the laurels of the past. "The French policy responsible for industrial settlement is now facing a double dilemma in Alsace and beyond," explains Jacques Sallois, head of the area planning agency DATAR in Paris. "On the one hand, we can now expect a regular net increase in jobs practically only from the activity of small and medium-sized firms. But they are often less mobile across national borders and also require more extensive and special assistance in getting set up at the new site. On the other hand, the regional planners must think more in European dimensions than before so that they can use tax monies effectively and so that such public investments will pay for themselves in the long run."

Strassbourg and Alsace have recently thought of all sorts of things to solve both problems. The more, for example, that the preferential rates of interest granted primarily to middle-class enterprises lost importance, the more important long-term secured credits or capital participation become for them. "In 1983, smaller French and guest firms could still count on reductions of 3 to 4 percent in interest rates," says Jean-Pierre Steffan, assistant general manager of the regional financing company SADE, in describing the current trend. "In 1986, on the other hand, this margin had shrunk to a half percent as a result of the lower interest rates and a more austere budget policy on the part of the state." In this situation, it is worthwhile for enterprising members of the middle-class to make use of the comprehensive instruments of companies such as SADE.

Founded back in 1955 to facilitate access to regional financial and capital markets for Alsatian family enterprises, today the company is involved in some 1,000 firms with 2 billion francs in long-term loans and 100 million francs in capital participations. Jean-Pierre Maitrot, manager of the Strassbourg branch of SADE, stresses: "Naturally our customers also include Alsatian branches of such German and Austrian enterprises as Alko, Behr, Bleyle, Birkel, Endress and Hauser, Gallus, Gruber, Weber, Hager, Wanzl and others."

For the realization of such special tasks as the founding of enterprises, technical innovation, and the leasing of buildings and facilities, SADE participated in additional financing companies and investment funds such as PRICE, Innovest and Alsail. "Such special institutes became necessary when the structure specifically of the German guest firm customers in Alsace began to undergo more and more obvious change," says Michel Doare, consulting

engineer with Innovest. "Whereas through 1970 the first generation of Alsatian branches of enterprises from the FRG was almost exclusively interested in reexports and the second generation through 1980 was interested in the capture of the French market, the strategic goal of the newcomers today is almost always immediate sales in the entire European market."

This observation confirms Sallois' thesis, according to which newly founded middle-class enterprises often have a high capital requirement per employee to put into effect their ambitious plans. They generally cannot cover this requirement on their own. At the same time, only a large number of such firms can create an appreciable number of jobs. To provide assistance in both directions, Innovest--founded in 1983--has so far given away 800 million francs in assistance to 240 firms. Doare: "Of these firms, about one-fifth are from foreign countries and about three-fourths of these, in turn, are subsidiaries of German enterprises."

At the same time, the bylaws of SADE and the other companies readily allow for financing across the border and even participation in risk-capital projects in neighboring regions (that is, in Germany). But no matter whether the financing and investment is on this or the other side of the Rhine, contact with SADE and the other companies always has the advantage for an enterprise that through them it can track down additional state and private sources of capital and credit. For besides the Economic Promotion Agency (ADIRA) in Strassbourg, shareholders in the company include leading Alsatian, French and even Swiss credit institutions. Besides money, of course, enterprises that want to utilize and market new products and procedures also need ideas and knowledge. Today both are abundant in Strassbourg and in Alsace. In the region's large-scale enterprises alone, research is being carried out in more than 100 of their own laboratories and 4,500 scientists are working in 250 public scientific institutes, including 500 with the regional branch of the French state research center (CNRS).

Besides Louis Pasteur University, there are technical colleges for physics, chemistry and biology. Since in addition the European Council and European Parliament also meet in Strassbourg, it was reasonable for France and Germany to propose that the city be the site of the central coordinating agency for the Eureka projects.

At the same time, Alsatian research and science is cooperating more closely than ever with domestic industry and guest firms as well as with European partner institutes. In the case of the technical college for physics, for example, which was raised to the status of a "grande ecole" in 1981, almost 50 percent of the budget already comes from research contracts--an unusually high percentage by traditional French standards. At the present time, the college is training 50 students and can train a maximum of 100. "They must conclude their studies here with a 20-week practical course in an enterprise or research laboratory," emphasizes institute head Prof Gilbert Sutter.

In developing its research and instruction programs, the "Sup de Physique" cooperates with the Karlsruhe Technical College, the Duisburg General College, and the physics department of the University of Vienna. In addition, Strassbourg and Duisburg jointly established the German-French Institute for

Automation and Robotics, which, along with photon research, is one of the specialties of Alsatian scientists.

Just as the physicists, the scientists of the Technical College for Polymer Applications (EAHP) work half of the time on contract research to improve the utility characteristics of plastics and half of the time on basic research in the physics and chemistry of organic melts. "But besides that, we also produce about 50 kilograms of extremely pure semifinished polymer products that serve, for example, in the production of optical fibers," says Prof Jean Terrisse, head of the department for application technology, in describing a spin-off of the scientific work of the EAHP.

Terrisse previously worked for years in industry and today still keeps in touch with many renowned French and non-French firms and is quite familiar with the requirements in the practical application of technical inventions. It is possible that someday the Strassbourg researcher would again find an industrial assignment stimulating. In any case, however, the addresses of his and other idea kitchens in Alsace are worthy of note. For it is precisely in the regions of Germany and France near the border that even more intensive cooperation than before is required. For one thing, to avoid costly parallel developments and, for another, to put Europe's research and industry in shape to catch up in the world marketplace. Specialists like Sutter and Terrisse are prepared to do this.

Lyons Gains Ground Internationally: Middle Class Helped City on the Rhone Master Structural Change

Of all the German-French city partnerships, the link between Frankfurt and Lyons is probably the most plausible. For everywhere the similarities between the transport and commercial metropolises on the Main and at the confluence of the Rhone and Saone are unmistakable: the futuristic skyscrapers of the banks, the business sense of the inhabitants, the obligingness of the hosts, but also the drawbacks common to both cities such as the controversial restoration of the old city center or their problems with foreign citizens.

But the importance of Lyons as an economic and financial center is far from being as well-known internationally as that of Frankfurt: "Despite all of our efforts and successes, our city still lacks the final touch of credibility," says Henri Moulard, assistant general manager of the Societe Lyonnaise de Banque (member of the CIC group). Naturally Moulard also knows the reasons for this shortcoming. It is not just that Lyons, like many other French cities, remained in the shadow of Paris for too long in the postwar period. Rather, it also lacks the European institutions of Strassbourg and the immense colony of international managers of Paris. Still, Interpol will be the first world organization to move to Lyons this summer.

But in regard to its business climate, structural data and gain of guest enterprises, Lyons is a match for French or German competitors any time. Thus the region's trade has recently jumped 15 percent and--in contrast to France

as a whole--last year it had a surplus of 2 billion francs in trade with the FRG. The supplier fair "Midest" at the Eurexpo exhibition grounds has also become popular with German firms.

There are 800 hectares of open land available in three city technology parks and two nearby industry and trade zones. The two external zones also grant settlement bonuses and tax relief. But French and guest firms are probably attracted not so much by such advantages as by a market of 1.3 million consumers in the urban area alone (5 million in the region) and a manpower potential of 670,000 people (2.2 million); one-third of the inhabitants of Lyons are younger than 20 years old.

Altogether about 100 French and non-French enterprises have become newly established in Lyons and vicinity in the last 10 years. "Among the German firms are such prominent names as Bizerba, Jungheinrich, Messer-Griesheim, Nixdorf, Phoenix and Rodenstock, in part even with manufacturing plants," rejoices Jean-Louis Masson, full-time hunter of investors with the economic development association Aderly, an organization founded jointly by the chamber of commerce, city administration and local patronage. Some German companies in Lyons even jumped at the opportunity to make favorable purchases. Thus Kabelmetal acquired the group Cables de Lyon, Mannesmann-Rexroth took over the firm Sigma, and Dresdner Bank acquired the banking house Veuve Morin-Pons.

Aderly, in turn, was able to entice such industrial heavyweights as the Swedish Asea concern (leading in European robotics) as well as the U.S. groups Monsanto (agricultural chemicals), Wang (European software translation center), and Carrier (air conditioning) into coming to Lyons. Schering-Plough, also from the United States, set up a pharmaceutical laboratory in the city. In hard competition with the regional planners in Bristol, the French finally won over Hewlett-Packard as well, which will put up a new computer plant on 10 hectares of land in the industrial zone at Isle d'Abeau 25 kilometers away; the firm already has an option for an additional 40 hectares.

Among the stars of the home industry of Lyons are the Merieux Institute, one of the three largest producers of vaccines in the world with numerous discoveries in human and veterinary medicine; the agricultural chemicals division of Rhone-Poulenc, which has again been enticed away from Paris; the nuclear plant builders Framatome and CGE-Alsthom; and the research center (SEPTEN) of the state energy supplier EDF.

Lyons has 3 universities, 13 technical colleges and 300 scientific institutes and laboratories. Besides an engineering and a commercial college as well as the National Institute for Applied Science (INSA), beginning in 1987 the city will also be the site of a technical college (Ecole Nationale Supérieure), which is to concentrate on the departments biotechnology, materials research, mathematics and computer science.

Naturally the recession and structural crisis of the 1970's did not fail to leave their mark on Lyons and its environs either: almost 15 percent of all traditional jobs fell victim to them. Instead of delaying unavoidable losses of employment in the textiles, metals and vehicle construction branches, one concentrated on the existing resources and on growth industries such as the

development of alternative energies, chemistry and pharmacy. This forward strategy also reduced the dependence of Lyons' economy on large-scale enterprises, which lost more than 40,000 jobs during the stagnation years of 1975 through 1982. To counteract this loss, the city administration and economy forced the development of middle-class industry, which also provided for a plus through the establishment of more than 50,000 new jobs.

Beyond that, public and private regional planners greatly stimulated, on the one hand, the technological transfer from research to industry and improved, on the other hand, the financial and organizational provision of parent and guest firms. "We regularly talk with university graduates and comb all of the laboratories and institutes of the region to come up with new ideas and talent," reports Aderly chief Jean Chemain, whose agency continually exchanges experiences with the East Bavarian Institute for Technology Transfer (OTTI) in Regensburg.

The systematic contacts of science and industry resulted in young enterprises such as Saduc, for example, that makes medical and cosmetic products based on collagens, or Transia, that developed up-to-date biotechnic procedures for the foodstuffs industry. Domilens produces artificial eye lenses that--unlike contact lenses--can be implanted permanently. Naturally the creativity of their hosts was no secret to the German branches in Lyons either: "I am very satisfied that we in our plant can also carry on some research and development," says Gert Benz, assistant business manager with the Mannesmann subsidiary Rexroth-Sigma. "For it is my feeling that the flow of ideas here in our department here is almost faster and richer than in the parent enterprise."

"If inventors lack the necessary start-up capital or if middle-class entrepreneurs do not have the necessary know-how, then we will jump into the breach," says Dominique Nouvellet, general manager of Siparex, in recommending the services of this regional investment fund. Siparex, in which foreign credit institutes--including Dresdner Bank and Creditanstalt in Vienna--are participating, independently invested about 150 million francs in long-term capital since its founding in 1976 in almost 50 small and medium-sized firms and the fund put another 150 million into syndicate projects.

Although actual risk capital makes up only 10 percent of the invested funds, "we want to expand this branch of business in the future and in individual cases we have even paid lost subsidies to inventors, about whose ideas we were completely convinced," explains finance director Bruno Ayciriex. In addition to the participation financing, the introduction of the shares of regional enterprises for free trading in the stock market ("second marche") represents a traditional focal point in the activity of Siparex. Altogether about 20 firms in Lyons have utilized this possibility for raising capital, including five with the help of Siparex. Some firms such as Salomon (ski bindings) and Majorette (toys) even had their titles officially listed on the stock market. Precisely the "second marche" awakened the previously somewhat sleepy Lyon stock market to new life; this year, for the first time, it may well clear the symbolic billion-francs hurdle.

"Naturally we always also pave the way for interested German or Austrian parties to the capital markets of Lyons," stresses Siparex chief Nouvellet, who conversely is now also intensifying the participation financing of his group abroad. Thus Siparex Participations, the subsidiary founded in Fribourg in Switzerland, invested in a family-owned machine tool manufacturer there.

Today investments in high technology and a greater international commitment are also among the priorities of the Societe Lyonnaise de Banque (SLB), which is a shareholder both in Siparex as well as in Sudinnova, the second regional investment fund. "We were one of the first French credit institutes to appoint a director for research and science, to acquire a regionally leading office for engineering services, and to establish a subsidiary for risk sharing," says Moulard in enumerating the evidence for the seriousness of the strategic priorities of SLB. In addition, his bank is participating with 10 million francs in the establishment of a European Research Center for New Materials of the Japanese Toyota concern at the technology park Sophia Antipolis in southern France.

It things were to go as such Lyons managers as Moulard and Nouvellet would like, then the city would soon draw a little nearer to Duesseldorf, Frankfurt and Vienna, at least as a European banking center and stock market.

#### Interview with DATAR Chief

Munich SUEDEDEUTSCHE ZEITUNG in German 18 Jun 86 pp 35-36

[Interview with Jacques Sallois, head of the area planning agency DATAR, by SZ reporter; date and place not specified]

[Text] SZ: What do you see as the most important results of the French industrial settlement policy?

Sallois: Two trends appear to me to be especially remarkable. For one thing, foreign investments in France have almost doubled in the course of the last 15 years. Whereas in 1972-1976 there were, on the average, only about 7,000 new jobs created annually as a result of such investments, it was already about 13,000 in the years 1982 through 1985.

For another thing, we are observing a better geographic distribution of these investments. In the beginning, they were concentrated largely in regions that were already highly industrialized, regions such as greater Paris, the department Rhones-Alpes, the upper Normandy, and Alsace, for example.

Since 1978, however, we have been seeing two-thirds of the new foreign investment in areas that also have priority with the official regional support: in the west and southwest of France, where there is pent-up industrial demand, and in the peripheral zones of the north and east that are dependent upon rapid scientific-technical structural change.

In my opinion, the fact that various enterprises followed up their first branch in France with others can also be considered a definite success of the regional policy.

SZ: Can you give some examples of this?

Sallois: Sony set up two plants in the southwest of our country in 1978 and 1982. As early as 1983, Canon built a factory for photocopiers in Brittany, which was followed by a typewriter plant in 1985 and a manufacturing plant for laser printers in 1986.

The same thing is true for the Americans. Thus in 1982, Samsonite created 150 new jobs in the coal basin in the north of France and 150 more are already firmly planned. Renix came to the Toulouse region with two plants in 1970 and 1982.

But the German guest firms are also making good progress. Examples are Bosch with its regionally unusual branch in Rodez on the southern edge of the central massif or Adidas, which put into operation a new plant in Lorraine a few weeks ago.

SZ: In your opinion, what moved the firms to undergo this expansion?

Sallois: Certainly our financially well-endowed system of settlement bonuses and tax relief that is adapted to the regional needs. But I think the specific economic advantages of the chosen sites also played a role, for no enterprise will make its settlement and expansion dependent upon public assistance alone.

SZ: What medium-term goals are being pursued by the policy of your agency and the ministry in charge?

Sallois: Naturally the immediate goal for them continues to be the gain in employment, up-to-date technology and economic power that results from the investments by guest firms.

So that we do receive this gain, we must in the future increase our regional policy efforts in three directions. In the first place, it is a matter of improving the image of the site France in Europe and throughout the world. Secondly, of the internationalization of our settlement initiatives. And thirdly, of the decentralization of decisions that serve the investor who is seeking advice and help.

SZ: What does that mean specifically?

Sallois: On the first point, it could be said that the French industrial capacity is still not always being assessed realistically everywhere. In my opinion, outdated ideas prevail above all in the FRG. So here, then, we must state more clearly than before that our enterprises, our technology, our manpower, the wealth and diversity of our regions, and the willingness to accept foreign investment have clearly undergone a positive change.

SZ: As for the second point, I would like to say that the DATAR now has 10 foreign offices in the most important industrial nations. Its main task is to inform interested parties promptly, reliably and in detail on the valid labor and tax law, the wage and cost levels, the development of the infrastructure,

and the state of research and development in France. In the coming months, the DATAR will put into operation a special data bank for this purpose named "Site." It is also to provide current information on bonuses and tax relief.

On the third point, may I point out that the DATAR has pursued the transfer of budgetary and decision authority to the French departments and regions through the establishment of local missions and delegations. Today, then, the investor generally finds competent officials with whom to speak "on site."

SZ: What arguments do you use in trying to get German and Austrian firms to establish themselves in France?

Sallois: In the first place, I would mention the increased geographic importance of France as a site for foreign investors through the entry of Spain and Portugal into the EEC. In addition, for German and Austria guest firms in the eastern part of the country, there is the advantage of the widespread bilingualism of the population.

In the long term, in connection with the expansion of the EEC in the south, the guest enterprises should also think about developing their trade with other Mediterranean countries and with Africa.

SZ: Certainly there are also structural data that you could present as reasons.

Sallois: With Marseilles, France has the second-largest port in Europe. The existing high-speed railroad line between Paris and Lyons and beyond to the south and east will be expanded in the coming years through similar connections to the Atlantic coast and to the north in the direction of Belgium and Germany. By the year 2000, we want to add 1,700 new kilometers to the existing 5,700 kilometers of highways.

Independent international comparisons have confirmed to us that the the rate of increase in productivity of the French economy is among the highest in the EEC, whereas the unit wage costs of our industry are lower than in Germany, Austria, Switzerland or even in the United States.

In the last 10 years, the number of French secondary school graduates has increased by one-tenth. That is the natural result of a favorable demographic trend, which France can also handle, because the population density is lower in our country than in Germany.

SZ: But that must also spur you on to special efforts in education.

Sallois: Yes, certainly. There is the plan to set up 100,000 computers in schools and to shift more universities, "grandes ecoles" and scientific institutes, research centers and public laboratories to the regions, above all to the 20 technology parks and innovation zones. The state is now expending 2.3 percent of the domestic product for research and development and this budget is growing about 7 percent annually.

Finally, certainly one of the arguments that speaks for the establishment of guest firms in France is also the fact that our middle-class enterprises, which represent 20 percent of the industrial production capacity, are equipped and prepared for high-quality supply functions.

And to say a word in our own behalf: our regional settlement aid can amount to as much as 25 percent of the respective investment value.

SZ: What obstacles would you most like to see eliminated in the coming years so as to give further encouragement of foreign investors?

Sallois: Here I believe it is primarily a matter of eliminating prejudices, not only with respect to the supposedly deficient capacity of our industry and economy, but above all in regard to the supposed French reserve relative to guest firms.

As a matter of fact, the French attitude in this area has become much more flexible since 1980 and restrictions for foreign investments now exist only in a small number of exceptional cases.

Above all, however, the attitude of the French public toward them has basically undergone a positive change. In addition, today the individual regions in France are actually competing to bring in the guest firms--an astounding fact considering the previous practices.

With a view to Germany and Austria in particular, I can say that the competent branch office of the DATAR in Frankfurt, the BIEF, has sufficient authority to locate promising investment projects and to give expert advice to their initiators as well as to provide support in carrying out a project through conceivable technical and juridical information.

SZ: The competition for foreign investors is constantly increasing worldwide. How do you assess the effectiveness of French efforts in this area?

Sallois: Reliable international statistics have so far been lacking on this subject. I can therefore take a position on only a subarea but on one that seems to me to be revealing. By this, I mean the Japanese investment activity in Europe.

In this connection, one must first of all know that of the 166 Japanese branch enterprises in Europe in 1985, one-third were from the time before 1975 and one-half from the years prior to 1980.

But prior to 1975, only two of the Japanese projects had been carried out in France--the same number as in Greece at that time. The lion's share then went to Germany with 12 projects, followed by Spain and Belgium with 10 each, and Italy and England with 6 each.

By 1985, however, France had worked up to second place and the sequence was then: 23 projects in our country, 16 in England, 11 in Germany and 6 in Spain.

It may be that in this success a role was also played by the fact that the DATAR now has its own offices in Tokyo and Osaka. In any case, I believe that the indicated numbers are clear evidence of the effectiveness of our efforts.

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CSO: 3698/573

## EAST EUROPE/AEROSPACE

### NEW METEOROLOGICAL EQUIPMENT INSTALLED

AU220731 Budapest NEPSZABADSAG in Hungarian 19 Jul 86 p 20

[MTI report: "More Reliable Forecasts -- Modernization planned for the Meteorological Satellite Receiver System"]

[Text] Domestically developed and manufactured equipment is being used to modernize the receiver system of meteorological satellites of the National Meteorological Services [NMS]. As a result, the digital processing of satellite pictures will already begin this year. The National Technology Development Commission granted 70 million forints to develop the modern system, which will make short-term meteorological forecasts more reliable in our country. Experts will be able to transfer data on weather faster and more accurately to the more than 100 institutions and firms that use such information.

The development has become necessary, because the satellite systems providing meteorological information were adapted to receive digital, in addition to the traditional visual, picture transmission. Signals ready for processing are also sent to ground observatories by the European Space Research Agency, the Soviet Meteor satellite system, and several United States satellites. With the new equipment the NMS will receive transmissions from all three satellite systems.

The two-unit equipment will be installed in the NMS' Central Forecast Institute in Pestlorinc. The receiver, which is equipped with a high capacity antenna capable of taking signals from satellites, was designed and made by the microwave department of Budapest Technical University. The computerized picture processing system connected electronically to the equipment has already been prepared by experts of the Coordination [koordinacios] Institute of Computer Technology. The two pieces of equipment will be connected and put into operation at the end of the year.

With the new system people will take and immediately analyze satellite pictures at 30-minute intervals day and night. The pictures will provide exact information on clouds influencing weather conditions in our country, as well as on the amount of precipitation, ground temperature, extent of fog, and regional distribution of sunshine.

With the help of the computerized telex network of the post office the NMS will immediately transfer the received and processed data to consumers. Among others, agricultural and transportation firms will receive reliable information more frequently. More precise information will be of great importance primarily of the meteorological service provided for civil and agricultural aviation. The National Water Affairs office can, among other things, use the more modern forecasts in flood prevention.

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CSO: 2502/74

## EAST EUROPE/COMPUTERS

### SPIEGEL COMMENTARY ON GDR COMPUTER TECHNOLOGY

Hamburg DER SPIEGEL in German Vol 40 No 20, 12 May 86 pp 75,78,79,81

[Text] The East Germans are trying to open themselves up to the West in the area of computer technology. Up until now, they have been lagging far behind.

Grey suit, decent tie, approachable, careful in tone--and on his desk the new status symbol of progressive management, a personal computer: Uwe Wulf is one of the modern managers that spring like piecework from industrial society.

You would have to take a fairly close look in order to recognize the small difference. The discrete insignia in his buttonhole identifies Wulf as a member of the Socialist Unity Party of Germany (SED), and the computer bears the trademark "Robotron," which is largely unknown in the West. Uwe Wulf is the first assistant general manager of the nationally-owned GDR combine which manufactures these computers.

The comrade director, like his West German colleagues, has adopted American computer jargon to the fullest extent. "The CAD/CAM stations are linked up on-line with the 1056," he explains in a laid-back fashion.

The time has come. Not Marx and Engels, but microelectronics and computers are the key words of the Socialist Revolution. For months the party media have been deluging GDR citizens with essays on "flexible manufacturing systems" and the like. The workers send delegations "with a communist greeting" to the Central Committee of the SED: "We are fighting for the highest degree of automation in the implementation of modern CAD/CAM technology."

East German joke production has long since joined the hi-tech ranks. The American abbreviation for Computer-Aided Design/Computer-Aided Manufacturing stands for "Computer am Dienstag/Chaos am Mittwoch" [Computer on Tuesday/Chaos on Wednesday] in the GDR.

Last week, the Party Congress turned for hours into a computer seminar. The first speakers were delegates from the Carl Zeiss Combine in Jena, Robotron and the machine tool combine "7th of October." These three nationally-owned enterprises comprise the forward echelon in the march into the chip revolution.

Whatever the West has produced over recent years with the help of microelectronics in terms of fashionable accessories and practical products--the GDR has it already or wants to have it soon.

In the post office near Alexanderplatz in East Berlin is located one of the first money machines of the GDR. The plastic card needed to operate the automat is a sought-after status symbol of Eastern elite.

The East German postal system in Berlin celebrated the 35th anniversary of the founding of the GDR in 1984 by laying the first glass fiber line with light wave conductors of the Oberspree Cable Company. In the meantime, seven lines have been installed in East Berlin.

In the Sachsenringwerk in Zwickauer, industrial robots weld and spray paint the chassis of the venerable GDR-mobile, the Trabant. The machine tool combine "7th of October" presented a computer-controlled factory at the Leipzig fair this past spring. Driverless electric transporters ran around as they do in the ghostly Hall 54 of VW in Wolfsburg, the prototype of fully automated production.

The GDR leadership is firmly resolved to push forward to world leadership in the chip revolution. Even Western companies such as Siemens have difficulties in developing the newest generation of these minuscule electronic components. But the GDR is certain of victory: "With the products manufactured in 1985, we have created important prerequisites for the production of the 1 megabit memory chip," boasted the nationally-owned Zeiss company in Jena.

There is quite a bit of propaganda involved in all this. Whatever socialism itself has not yet created is now to be brought about by the "key technology" (SED head Erich Honecker): "Great national economic effectiveness, flexibility and adaptability"--as Robotron, for example, praises the effectiveness of its CAD/CAM systems, by means of which components can be designed on the display monitor and results transferred directly from the computer to the electronic control system of the machines.

The computer craze has swept not only the GDR; the entire Eastern economic alliance, CEMA, is on its way into this brave new world. Last December, the ten East Bloc states announced in Moscow a "complex program" for technological-scientific development to the year 2000.

The socialists entertain no scruples with regard to the new technology. Job shortages or data protection are of no interest to Eastern managers. "Technology is international," is the motto of Helmut Ziegegeist, the "director of basic work" at Robotron. "Utilization is determined by the social systems." And anything that the socialist system may perhaps not be in a position to bring about can be taken care of by Mother Nature: "The generation born after the drop in the birth rate is now coming up in our country," the communist points out reassuringly to those concerned about job availability.

The computer revolution is taking place in the enterprises. Despite all slogans to the contrary, private citizens have hardly an opportunity to obtain

a device. Up to now, VEB Mikroelektronik has produced all of 700 home computers with a unit price of M1700. And these well-guarded machines are used for instruction in the schools.

GDR kids are no less fanatically interested in computers than are computer freaks in the West. At the Robotron stand at the Leipzig Fair, they crowded around devices which the combine had made available for public use, in keeping with the practice of Western computer firms. Western exhibitors at the fair, such as Epson, a Japanese company, had to close their stands at times: the crowd had gotten too large.

The capitalist computer corporations are the secret trend-setters for the nationally-owned computer manufacturers in the GDR. Robotron director Dieter Berger rejects the ideologically suspect notion that IBM could be his model, "although in certain areas this might well be worthwhile."

From the very beginning, the red programmers copied quite shamelessly from Western companies. The first mainframe of the Soviets of the Eser model were built according to the prototype of the IBM 360 series; the mid-sized computers according to the PDP 11 series of Digital Equipment, the second-largest computer company. Robotron's microcomputers are based on a US operating system, CP/M, which was used in the early phase of home computers. Here the East technicians have not yet been able to link up with Big Momma, IBM.

"We are in the fortunate position of not being obliged to go along with every twist and turn made by IBM," says Robotron manager Ziegenggeist, wishing to see a silver lining in the distance separating his company from IBM's advanced technology. But in reality, the programmers have been working for quite some time on an Eastern version of the IBM MS DOS standard for personal computers. This is done if for no other reason than because at some time in the future, the GDR would like to export larger amounts of its equipment to the West.

Nonetheless, the lag behind Western technology is everywhere evident. Despite vigorous efforts, experts such as Gerhart Adler of Diebold, a computer consulting firm in Frankfurt, believe that "the gap will continue to widen." Even Eastern managers candidly grant that they are still very far remote from the class objective. "We must pick up speed," said Ziegenggeist, "we need to catch up in certain areas."

GDR leaders recognized the importance of microelectronics for their economy even later than did their counterparts in West Germany. To be sure, the word itself appeared in the slogans for the Party Congress in 1976, but there was no follow-up action. In 1982, Wolfgang Sieber, general manager of Robotron, was quietly removed from office because the combine had evidently failed to fulfill plan targets.

GDR managers admit that "we were not pleased" with the embargo policy of the West. The export ban on chips and computers which might possibly be of military advantage to the East hampered civilian applications. GDR electronic technicians must acquire their know-how in unconventional ways. For example, Siemens, the electro-multi based in Munich, supplied medical electronic

systems which were exempt from the embargo to hospitals in East Berlin. However, this is for the time being of no use at all to the patients. Experts disassemble the devices, searching for useful individual components of Western technology.

Robotron manager Ziegengeist estimates that it will take "two to three years" for the GDR to reach a top position in microelectronics, "but this is of course relative." He means: it also might take a bit longer.

And it certainly will take longer. Not until early this year did Robotron begin series production of personal computers of a standard that has been common in the West for at least four years--computers using more efficient 16 bit microprocessors.

However, world-class technology has been working for at least three years with 32 bit processors, which operate twice as fast. The first prototypes of this generation of chips are being produced in the USSR and in Czechoslovakia. The GDR has not yet reached this stage. Juergen Elsholz of VEB Mikroelektronik is confident: "This is certainly coming."

The question is only: when? Like the microprocessors, the central brain of the computer, the situation is similar for storage chips, the memory of the computer. The impressive words of the comrades of Zeiss Jena regarding preparations for the 1 megabit memory chip no longer sound so wonderful when one knows that only at the beginning of this year did the VEB Mikroelektronik begin series production of a 64 K memory chip--i.e. a capacity of less than 10 percent of the megabit chip. The GDR lacks an entire generation of micro-components as intermediate stations on the way to the mega-goal.

The fact that the GDR lags behind in advanced technologies is by itself not the worst. After all, GDR combines are not forced, as are Western companies, to engage in international competition on world markets.

The problems that the combines have in the area of mass production are more serious. The functionaries attempt to make an impression with incredible unit quantities. But the reality is still very paltry.

For example, there are said to be 57,000 industrial robots; this would be more than in the FRG. Anything that can shove a work piece from right to left is evidently counted here. Complex automats with 6 movement axes, as Western experts define these robots, are a rarity in the GDR.

Nor are the comrades really so badly off, with an alleged 350,000 personal computers; in the FRG there are roughly 650,000 pc's. But most of the GDR microcomputers are devices of a type used in the West as home computers for use by children.

Nonetheless, GDR managers are able to demonstrate their best successes in the West with computer brats. Last year, Robotron exported 10,000 printers to capitalist countries. These robust machines from the East, which can be .pa interfaced with all familiar Western home computers, are "hot items," in the

enthusiastic words of a salesman from KaDeWe, the Berlin department store: "At Christmas time we were completely sold out."

But unfortunately the nationally-owned enterprise cannot truly enjoy its success in the West. The department store corporations appear embarrassed about their imports from the East. There is not even a small sign on the backside of the printer to indicate its origin in the GDR. And instead of the suspicious trade name of "Robotron," the front side of the device prominently displays the distinguished name of a fantasy firm: "President."

13139

CSO: 2302/17

## EAST EUROPE/COMPUTERS

### USE OF PC 1715 COMPUTERS IN GDR TRANSPORTATION

East Berlin TRIBUNE in German 13 Jun 86 p 12

[Text] Today it is no longer possible to imagine many areas of transportation without computer technology. Microcomputer-assisted ticket window printers and automatic dialog machines speed up ticket sales at railroad stations. Microcomputers draw up schedules and help to channel the flow of freight or at work in locomotives, airplanes and ships. Computers control traffic signals, give commands to industrial robots and make work in the laboratory and the office more efficient.

Transportation alone received 805 newly developed Soemmerdaer PCs at the beginning of the year. Only a few people have any experience with them. The software laboratory which was established in April of this year at the Central Research Institute for GDR Transport (ZFIV) is designed to help to change that. This has special importance there, because the computers are to be used principally to increase the pace of research.

#### Additional Training Needed

"The rapid qualification of the Institute's staff is proceeding in three directions," explains Henryk Schaeling, section head in the Center for Process Automation at the ZFIV. The largest group of users will work with pre-established programs, such as those for word processing or solving economic problems, and they will only need to learn to use the computer keyboard. Supposedly it is possible to learn to operate the PC 1715 personal computer in about 30 hours of instruction, rather like driving an automobile. It is beneficial to work on the computer from the very beginning. Henryk Schaeling is emphatic on this point: "The computer tells you when you have done something wrong." At the present time, nine personal computers and six KC 85/2 minicomputers (home computers) have been installed in the software laboratory.

Some of the university and technical school cadres will also have to learn how to program these computers. Learning the programming language is the prerequisite for fully utilizing the computer's creative possibilities in research. The easiest programming language, which is also used for home computers, is known as BASIC (simple, universal, symbolic programming language). This language can be learned relatively easily, but its limitations are too narrow for daily practical use. The higher programming language for the PC 1715 is more difficult to learn, but it allows work to be carried out more efficiently and quickly.

A third staff group has to be able to service and maintain the modern equipment. The Robotron combine cannot assume this task by itself, since the number of computers in use will continue to grow rapidly.

A third staff group has to be able to service and maintain the modern equipment. The Robotron combine can assume this task by itself, since the number of computers will continue to grow rapidly.

Preparations are presently being made for double-shift operation of the software laboratory. The technical installations will then be available to other institutions for qualifying courses.

#### Engineering School Formed

In addition, the computers are available to all areas of the ZFIV for its daily work, since computers cannot be installed everywhere. The robot specialists at the Institute are among those who are already using the new equipment. Also in April they started operation of another institute to speed up progress in research and development in transportation: in conjunction with the Deutsche Reichsbahn, an engineering school for "Robot Technology and CAD/CAM Technologies" was established at the Franz Stenzer railroad repair yard in Berlin.

The engineering school for robots will create a closer link for the scientists at the Institute with practical applications. Here, the robots they develop can be tested under conditions that approximate those of actual production, and in this way they can be modified to meet the actual givens of use. Difficulties encountered during start up can be identified and corrected before actual use begins. Future users can familiarize themselves with the equipment at the engineering school. Engineers, foremen and welders are trained here to operate and service the robotics equipment. The payoff comes when the robots begin operation, because this helps to shorten the time before they are phased into manufacturing.

The experts at the Institute are adapting standard ZIM robots to the specialized demands of transportation. These range from working out the details of individual programs, setting a robot's environment, to the design of highly sensitive sensor systems. Monika Wilde, staff scientist at the Center for Process Automation at the ZFIV, reports: "These robots will be used by the Deutsche Reichsbahn for the manufacture of new freight cars, passenger coaches and containers, and for the manufacture of spare parts and the remanufacture of components."

For example, a sensor developed at the Institute makes it possible for a welding robot to follow exactly the seam to be welded. Robot experts are also investigating with the help of the PC 1715 personal computer whether the work steps suggested by those in production can be carried out economically by a robot at all. Not all work steps are suitable for automation. The staff in this area is trying to make multiple use of solutions that have been found to be optimal for various tasks.

9581

CS0: 2302/26

INSUFFICIENT COMPUTERIZATION OF POLISH FINANCIAL SECTOR

Warsaw ZARZADZANIE in Polish No 4, Apr 86 pp 3-5

[A discussion by a panel of experts on management computerization moderated by Jozef Sniecinski and Tadeusz Podwysocki, editors of ZARZADZANIE: "A Computer for the Accountant"; date and place not specified; the first paragraph is an introduction]

[Excerpts] The area of accounting, otherwise known as bookkeeping, is conducive to computerization. This is indeed what is taking place the world over, where bills, balance sheets and circulation of goods and money are largely handled by computers. In the meantime, in Poland the organizational and technological gap in this area is increasing every month and every year. ZARZADZANIE invited for a round table on this subject: Prof Dr Tadeusz Peche of the Institute of Data Processing and Accounting of SGPiS [the Main School of Planning and Statistics]; Jerzy Sablik, president of the Society of Polish Accountants; Ryszard Kloczewski, the chief accountant and president of the District Board of Bialystok Society of Accountants; Stanislaw Koc of the Ministry of Communication; and Tadeusz Tylewski, director of Accounting Services Enterprises at Poznan. The editorial board was represented by editors Jozef Sniecinski and Tadeusz Podwysocki, who moderated the discussion.

TADEUSZ PODWYSOCKI: One of the first areas to be computerized everywhere in the world was finances. Computers offer a basis for economical and well-organized operation of banks, insurance companies, trade and industry. They made it possible to introduce new systems of recordkeeping and money transfer. The installation of cashier terminals, automatic cash machines in banks and computers for transfer of funds between them is proceeding at a very fast pace and is already penetrating into the so-called third world countries. It is obvious that, thanks to microelectronics, the world is moving to a cashless and checkless society with flows of money becoming streams of electrons in computer circuits. This makes one stop and think: Where are we? What is the state of computerization of finances and accounting in Poland?

T. PECHE: Computerization is in bad shape. It was only in the late 1970's that the thought of computerization appeared. It was started by mathematicians, who had no idea of economic management, or by engineers, who looked at computerization exclusively through the prism of industrial organization.

The entire sphere of finances and accounting fell out of the field of vision. The fact that in highly developed countries this was the first sphere to be computerized and that already a decade ago the degree of computerization was in place there which we have yet to reach was completely overlooked. I believe that our lag in computerization of accounting is at least 15 years.

J. SABLIK: I would add that one of the root causes of the current crisis in computerizing of finances and accounting is underestimation of currency in the country. Counting money and money circulation are considered to be third-rate activities. This comes from the obligatory recognition of the priority role for technology. In reality, however, no modern management is possible without modern recordkeeping and rapid supply of data. The prevalent belief, however, is that accounting serves only to prepare a balance sheet, which is needed to evaluate the profits and eventually to compile an overall balance sheet of the industry. It was an established principle that accounting should not be used in current management, which operates by instinct, without specific calculations. No thought was given to costs. As a result, there was no need for collecting, processing and analyzing data. All this calls for breaking the prevalent notion of finances, changing the mentality of the entire society. For example, in Poland there are some primitive solutions in the form of savings-settlement passbooks and checks, but nobody is willing to accept those checks. This is a classical example of a negative attitude to cashless settlements.

T. PECHE: We must dot the i's here. All this is obviously a consequence of centralistic method of economic management by decree and thinking in such categories. When one thinks in market categories, immediately, accounting, finances, profits and balance sheets acquire their concrete meanings. When one operates by decree from the top, balance sheets are not necessary, not to mention computerization.

T. TYLEWSKI: There is a certain polarization of interests among computer specialists in Poland and a flight from financing and accounting matters. Recently, I published an ad with job offerings for accountants who had a familiarity with computerization or computer scientists with some knowledge of accounting. I received a large number of proposals but was unable to hire a single person. There were no accountants-cum-computer specialists. Some were computer scientists who in their previous experience had to do with management of materials and materials documentation. None showed any familiarity with finances and accounting. But the knowledge of computers is insufficient. One must also understand the system of finances, and computer experts entirely lack this knowledge.

R. KLOCZEWSKI: As far as computerization at enterprises is concerned, I share the views of the preceding speakers. In most cases, the introduction of computer systems was the responsibility of computer experts who did not understand in depth the problems of enterprise organization and had not even the slightest notion of accounting. In my industry, the attempts at computerization first started in the 1970's. Swedish equipment and knowhow were used. We began the automation of accounting at Elek with evaluation of the production

results and warehouse management. These efforts provided a basis for automating the bookkeeping as the next stage. In this way, we gained extensive experience, and further steps toward computerization of basic documents and time-consuming bookkeeping became real. We then fell into the troublesome period of general crisis, when it was impossible to obtain the necessary computer hardware for other industrial plants in the country. Until now, we have only two computer systems--at Elek and at Kole. At these plants, however, nobody can even imagine how they would work without a computer.

S. KOC: It seems that currently, despite all the obstacles, the computerization of accounting and finances will have the largest chance. This comes from the prosaic fact that increasingly fewer people are willing to work in financing and accounting, especially when this work, as it has been until now, is manual, tedious and gives no satisfaction. In addition, the documents are always prepared too late.

There are, however, two obstacles. First is the shortage of funds; the other is the shortage of skilled personnel. Today, the enterprises are not fully aware of the trends, needs and capabilities of computerization of accounting and bookkeeping. The situation is bad and progress minimal as far as the acquisition of facilities and personnel training.

T. PODWYSOCKI: So it is pointless to think about the actual capabilities of computerization in the financial sphere, including automation of bookkeeping work. It seems that we would like to shoot but lack ammunition...

T. PECHE: As far as personnel is concerned, in a few years significant progress could be achieved. Everything depends on the realization of production programs in computer industry and supply of facilities in the late 1980's. I would like also to point out another important shortage. No progress is now being made in system solutions. We are still imagining that accounting is something specific and different for each organization. We think that all it takes is to automate this process. I believe, however, that a new system must be found. This would involve solutions on a nationwide scale covering all the banks, finances, documentation circulation, money flows and bookkeeping.

J. SABLIK: At the Society of Accountants, a program of activities for computerization has been formulated for 1986-90. We proceeded from the principle that system research should not be neglected, and for the first time in Poland the society joined the central program of scientific research for modernization and computerization of the accounting system as the program coordinator. After all, we stand the closest to the users and bring together all experts and scientists in the sphere of finances.

An important element of our program is providing the hardware for computerization. A report on the current situation at financing and accounting services and conversations at the government level resulted in a support by the Government Presidium and the decision at that level for allocating funds to improve the financing and accounting operations. The decision was passed in December

of 1984. This degree of the Government Presidium offered a basis for our initiative, insisting that in the production of modern hardware only microcomputers should be considered. We have stated the issue clearly: There should be a government contract. But it should not only include computers, but a complex of measures including the production of hardware, software and installation at the user organizations. The customer must receive a complete system, which should be immediately operational.

Another condition is that the production of computer hardware should take full account of the user demands rather than be guided by the habits and profits of the manufacturer. The equipment should correspond to the operation conditions of financing and accounting services. Our program stipulates that on behalf of users at the Society of Accountants both the hardware and the software will be reviewed.

We have also introduced basic changes in the training of management personnel. Modernization has penetrated into the system of training of accounting experts with diplomas. A new subject has been introduced which teaches organization of accounting work in combination with computers. The first steps thus have been made. The program exists, but--I emphasize--it is launched by a public organization and requires government support. After all, our society cannot accept responsibility for the development of computerization of finances and accounting in the entire national economy. We expect that both government contracts and the research program, as well as concern for realization of these areas of computerization launched by us, will become the focus of attention of government authorities.

T. TYLEWSKI: The program calls for maximum use of domestic computer equipment. We don't have foreign currency to buy equipment. In the past, the hardware was first purchased and then efforts were made to find an appropriate user--the buyer. Computer systems were sometimes delivered to enterprises. We didn't know what to do with them or could only partially use them. We were not prepared for computerization. Often the equipment was unsuitable. Currently, the Ministry of Foreign Trade has been obligated by the government to ask for the opinion of the Society of Accountants as to the possibilities of using a particular computer equipment for bookkeeping and finances.

J. SNIECINSKI: Without hardware, no automation of accounting will be possible. With today's development of microcomputers, microprocessors and personal computers, I believe that this equipment will appear in our markets. The sooner the better. But there are still obstacles. I'm not sure that we will have equipment that one could put to work simply by turning a key like in a car engine. This will not happen. It will be necessary to prepare for its use considering the specifics of almost every organization. I believe that there are two barriers here. The first is preparing an enterprise in terms of organization and management and developing a new mentality. The other barrier is finding the personnel. In late 1979 we had almost 60,000 people to a smaller or lesser extent associated with computers. Today, just about 20,000 are employed in this area. There has been a massive exodus. Electronic engineers, mathematicians and computer experts are driving cabs to make a living.

T. TYLEWSKI: Another important problem is maintenance service. It has always been the sore spot, and we must make sure that the problem is resolved in the future. Together with equipment, service must be guaranteed. This is a crucial issue, and unless safeguards are put in place for maintenance and repair services, the entire program of computerization may become useless.

R. KLOCZEWSKI: From personal experience, I can say that it is not easy to find personnel familiar with computers in industry. One has to train people in one's own field. Most employees are recruited from schools of economics and universities. It is the function of the Society of Accountants to help these computer specialists to adapt to the needs of the enterprises, finances and bookkeeping. Today the schools do not provide the supply of skilled personnel capable of computerizing bookkeeping and finances. We therefore must teach and train them in the framework of the Society of Accountants.

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CSO: 2602/43

DEVELOPMENT OF ROMANIAN COMPUTER INDUSTRY

Bucharest VIATA STUDENTEASCA in Romanian 7 May 86 p 5

[Article by M. Gigore and S. Rosca-Stanescu: "Toward Building the Economy's 'Electronic Brain'"]

[Excerpts] In a relatively short time, Romania has joined the ranks of countries producing electronic computers, most of them being the result of original thinking by Romanian researchers trained in our system of higher education.

What was the status of Romanian electronics in the '50s? Those who still remember those years or who still own a wireless radio set of Radio-Progres or Bicaz type, built with foreign made tubes (truly museum pieces), are in a position to appreciate the giant leap that separates the workshops in which they were manufactured virtually by hand from the Pipera plant of today--a veritable turntable of Romanian electronics. In an extremely short time and at a sustained pace, the principal Romanian electronic and microelectronic components have appeared, from transistors of the most diverse types and uses to microprocessors, components that make the national industry of electronic computers possible. It is difficult to imagine today a medium-size enterprise without its own computing office, equipped with Romanian computers providing the most diverse of services. The most complex technological processes, in the chemical industry, in metallurgy, in the large thermoelectric power plants or in the materials industry are carried out precisely and efficiently by process control computers. Likewise, the computer has become an instrument of daily use by university students, beginning with their scientific research activity, followed by the planning of year-end or graduation projects and ending with the educational process itself--beneficiary to the new methods of computer assisted programmed instruction. Finally, with the appearance of the first Romanian personal computers on a rapidly diversifying scale, the computer has truly become an instrument of general use. It is fitting to recall with pride in our institutions of higher education, the way in which teaching cadres and university students have known how to involve themselves in accomplishing tasks of unusual complexity, taking part one and all in the search for the new, the fact that the RELIX series of computers, already known abroad, originated on the drawing boards of the automation faculty in Bucharest; that the CORAL series of computers was developed in the Polytechnic Institute in Cluj-Napoca and that the AMIC personal computer was

developed in the Polytechnic Institute in Timisoara, and so on. It is to the credit of the young Romanian electronics industry to have managed in an extremely short time and without the benefit of tradition, to put into serial production the latest fruits of scientific research obtained in an essentially revolutionary field.

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CSO: 2702/16

## EAST EUROPE/COMPUTERS

### ROMANIAN SPECIALISTS DISCUSS USES OF PERSONAL COMPUTERS

Timisoara ORIZONT in Romanian No 22, 30 May 86 p 2

[Article by Traian Pop Traian: "Computer Technology at Home and Within Everyone's Reach"]

[Text] The Timisoara Research Institute for Computer Technology, a landmark on our city's economic map, has started to implement one of the most recent advances in computer technology, the mass production of personal computers. We asked some of the specialists who issued the first "birth certificates" to answer the following questions:

1. What does the personal computer mean to you? What contributions did the Timisoara specialists make to the design, construction, and dissemination of these computers?
2. Describe some of the practical applications to which you have contributed.
3. What do you foresee for the future?
4. What has been done, and what do you believe should be done to introduce personal computers more rapidly?

Berindeanu Radu, scientific researcher, Timisoara subsidiary of IIC:  
"Personal Computers, Fundamental Elements of Tomorrow's Computerized Society"

1. The personal computer (in the sense of individual computer, fully at the disposal of the user) represents a basic instrument for processing information of any type, ranging from primary education to design activities in enterprises and institutions. In fact, as a result of its low cost, high reliability, easy programming, and availability, the personal computer becomes the fundamental element of tomorrow's computerized society. I will not dwell on the contributions of Timisoara's specialists to the general effort of our computer industry and to the promotion of the youngest member in the computer family; I will only mention the broad range of hardware expansions and application programs available for the aMIC personal computer, such as

analog/digital or digital/analog converters, the MIM-40 miniprinter, a minirobot, the DAF-2010 terminal, as well as a number of BASIC programs ranging from solutions of systems of equations, to stores management, and games of mental skill.

3. The impact of personal computers on socioeconomic activities is still unsuspected at this time; I would not hazard to say that in the near future most of us will know how to program in BASIC, but it is certain that without personal computers we will not be able to fulfill increasingly complex tasks in any area of activity. In this respect, our specialists' effort to build new personal computers comparable to similar products on the world market is a praiseworthy one. The ZXTIM and SPECTIM family of computers opens the extremely vast horizon of existing application programs. Moreover, the new products will have improved technical performances, and will have interfaces for connection to floppy disks and local computer networks, thus making it possible to computerize any enterprise, institution, school, commercial unit, and so on.

4. A worthwhile effort in this area has been made by Editura Tehnica with its volume 51 in the AMC series, and the "All About the aMIC Personal Computer" books, under the coordination of Prof A. Petrescu; however, these are only a first step, still inadequate in the face of the great "information hunger" in this area. BASIC programming courses can be organized in high schools, personal computer user groups can be organized in institutions, enterprises, and anywhere there is an available computer and some enthusiasts, all of it with enormous benefits. We must not forget that programming is the most time consuming activity; while the mass production of personal computers does not present particular technical difficulties, the writing of programs to meet the demand could in the near future involve a large portion of the active population, without being sufficient even then! That is why any investment, either material or educational, in personal computers can only bring unquestionable benefits to our society in its full technical and economic thrust.

Agota Matekovits, primary scientific researcher, third level, Timisoara subsidiary of ITC: "Buy Software!"

1. Not long ago, large computers enclosed in glass walled, air conditioned rooms represented for most people a curious, incomprehensible machine, the isolation of computer power representing an impenetrable barrier for computer technology. As a true explosion in this area, the appearance of mini and microcomputers, and especially of personal computers (characterized among other things by very low cost: usually, a TV set for display and a tape recorder for program and data storage), has made it possible to disseminate computer power in departments, institutes, laboratories, and so on; these computers have become the inseparable friends of those who work in the most diversified areas: engineers, doctors, designers, professors, economists, agricultural specialists, and so on. Notable in my opinion is their use in education: five or six-year olds throughout the world are presently "working"

on them with amazing ease. In order to hasten the dissemination of this knowledge among our country's children, various clubs, courses, and camps have been organized, where Young Pioneers and students become familiar with the new concepts of hardware and software, and learn how to use them. This new generation, accustomed from an early age to the presence of computers, will use them at first for games, it is true, but having lost any resistance to computers, the transition to useful applications will require only one step.

2. "Buy software!" was the title of an article in TIME magazine, which shows that everyday life involves and requires the use of computers. But since these machines are useless without programs, and the fields of application are very diversified, and not all users know how to program, hundreds of programming specialists have appeared throughout the world. The aMIC personal computer can be used for elementary mathematics, statistics, economy, technology, education, graphics, and games. Games and educational programs such as the syllabication exercise are extremely useful for students: the program displays a parsing rule followed by an example, and then offers several exercises which the student must complete.

The knowledge of a group of candidates is tested in various areas; tables can be created in the computer's memory or as an external questionnaire. In either case, the user answers the questions; as the set of questions is completed, the examiner indicates the answer which he considers correct, and in the case of errors the computer indicates the correct answer; at the end, the computer totals the exact answers. For group examinations, the average number of correct answers for the group can be displayed after all members of the group have been examined. Another example is a variation of the game which requires that a combination of four colors be determined from six colors in a given order. The adaptation consists of selecting a combination of four figures from six possible ones. The Perspico game consists of placing the sign (o) of a player against that of the computer (x) in a straight line or on a diagonal in a three by three square. Another game, the Towers of Hanoi, requires that a stack of discs arrayed in decreasing size on a stake, be transferred to a third stake using a middle stake as intermediate storage. The discs are designated by asterisks, and the rules of the game do not allow that a larger disc be placed atop a smaller one. The drawing of three dimensional figures in perspective is a useful tool for designers, the program allowing the generation of straight edged objects; the figure can be drawn from several points of reference, and/or can be turned in different positions.

The shortest path in a network can be determined between a starting and an arrival point, in each instance the network being defined in terms of its nodes and interconnections. Microfiles allow the creation and utilization of a micro-data base generated in the form of records, each of them containing several fields of different lengths. Its utilization consists in listing, deleting, adding, and changing the records; the latter can be selected according to various criteria, such that the processing of the records and files leads to higher performance.

3. In addition to the development of new computer models and the installation of a computer network, I consider as most important the diversification of existing application programs. To this end, we will seek to remain in constant connection with personal computer users, both to receive information about utilization, and to discover new areas in which computer power has not yet penetrated.

4. Firm measures are needed to extensively disseminate information about the use of personal computers. To this end, we must obviously produce them in sufficient numbers at accessible cost.

Crisan Strugaru, head of the Computer Department, Electrotechnical School, IPTV: "Students, Unburdened From Laborious Operations, are Drawn Into Activities That Challenge Their Creativity"

1,2,3,4. In higher technical education, the presence of personal computers represent a significant qualitative step. By engaging in direct interaction with the computer, students can more efficiently use their time by learning programming languages; in their more advanced classes, they can then attack more complex topics to determine optimum solutions from among several possible ones, by simulating the behavior of machines under various operating conditions, and so on. Students, unburdened from laborious operations, are drawn into activities that challenge their creativity. These are some of the reasons for which personal computers are in high demand and insistently sought by students. At the Traian Vuia Polytechnic Institute in Timisoara, a collective of teachers and students from the Automation Department of the Electrotechnical School, among which are the engineers Ioan Mos, Cezar Morun, Dumitru Panescu, Mircea Popa, and Constantin Manescu, the graduates Ioan Carlia and Endre Csont, and the students Liviu Tomsa, Horatiu Moldovan, and Adrian Spilca, in collaboration with specialists from ITC-FME, has built the SPECTIM family of personal microcomputers, whose performance is of international quality; also in this family is the ZX-TIM microcomputer, which will be produced for the consumer market. The concern to widely introduce personal computers in education and scientific research both for teachers and students in our institute, has produced outstanding results, which were announced at the symposium held last autumn, a symposium organized by UASCR in collaboration with MEI, to discuss computer-aided design. In terms of future prospects, I could mention that the mass production of the aMIC, SPECTIM, and PRAE microcomputers has already made the computer one of the indispensable needs in the collective effort to modernize our industry according to the tasks outlined by party and state leadership, and personally by Nicolae Ceausescu.

Our collective would like to implement as rapidly as possible the ITC initiative to establish in our school a microproduction subsidiary, in which students, under the coordination of teaching staff, will write programs for personal computers produced in Romania. Given the many specialties in our institute, the programs will cover a broad range of applications, thus expanding the program library available to personal computer buyers.

Constantin Novacescu, primary scientific researcher, third level, ITC: "The Personal Computer, a True Revolution"

1,2. For me, the concept of personal microcomputer represents a true microrevolution in information processing. In practical terms, from the conventional situation of collecting, processing, and interpreting data and information in a centralized mode, in a so-called "computer center," we have reached a situation in which information processing and computation tasks are performed in individual, personal micro "computer centers" at the user's place of work or home. Given such an information (data) processing and computation device, a TV set, and a (conventional) tape recorder, and eventually a means to print results, it is possible to effectively solve technical-scientific, economic, management, educational, or household problems. Throughout the world, the 1983-1985 period has been considered to represent a true explosion in micro computer technology. Today, many children spend as much time in front of a screen as they do in front of a teacher (personal computers are serious competition for video recorders). In 1985, more than 250 companies throughout the world produced and sold over 600 types of such computers in the tens of millions; in the light of this situation, specialists in our country have intensified their efforts to, among other things, introduce the mass production of two types of Romanian personal computers (aMIC and PRAE) at ITC-FME in Timisoara. The contribution of the Timisoara specialists was not negligible: it consisted of testing and improving hardware devices, developing and perfecting the software support, developing test equipment and procedures, and implementing manufacturing technologies suitable for mass production.

3. To begin with, I would mention the contribution of the Automation and Computer Department collective at IPT, which developed laboratory models for personal computers compatible with products of the English company Sinclair (ZX 81, ZX Spectrum), computers whose mass production will start this year. I would also mention our specialists' efforts to form a heterogeneous network for microcomputers which we will start to produce next year.

4. I believe that very little has been done. In my opinion, this topic should be a permanent feature in all mass information media (the press, radio, TV), at least one specialized magazine should be published, users' clubs should be formed, a national program library should be founded, a statute for software (program product) should be obtained, research and production efforts should be coordinated uniformly at a national level, symposia and discussions with users should be held more often, and the training of personnel and educators should be modernized by using personal computers.

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CSO: 2702/15

FIRST NATIONAL ROBOTICS CONFERENCE IN POLAND

Warsaw PRZEGLAD MECHANICZNY in Polish No 1, Jan 86 p 1

[Text] The Wroclaw Polytechnical Institute hosted 18-20 September 1986 the First National Robotics Conference. The conference was organized by the Institute of Technical Cybernetics, of the Wroclaw Polytechnic Institute in conjunction with the Silesia Polytechnic Institute and the Warsaw Polytechnic Institute. Among the sponsors of the conference were the Ministry of Science and Higher Education, the Ministry of Metallurgy and Machine Building Industry, the Office of Science and Technology Progress and Implementation, the Automation and Robotics Committee of the Polish Academy of Sciences (PAN), the Polish Committee of Gaging and Automation of the Chief Technical Organization (NOT), the Machine and Mechanisms Theory Section of the Main Administration of the Association of Polish Mechanical Engineers and Technicians (SIMP) and the Main Administration of the Polish Cybernetics Society.

The main goal of the conference was to review the state of the art in the field of robotics. The subject matter of the conference was the theory and application of robotics and automation. The following problems were included.

1. Design and Use of Robots - Papers presented covered, among other things, robot design standardization and uniformity, reliability testing, diagnostic usability of equipment, security systems, kinematic and dynamic models, robot design.
2. Industrial Application of Robots - The authors focused on the following subjects: technical, economic and social aspects of robot application; experience with automation of production stands and lines; programming and servicing of automation systems; the possibility of use of robots in medicine; design and implementation of flexible automated production systems; modelling and simulation methods and computer-aided design of automation systems.
3. Artificial Intelligence Techniques in Automation - These papers dealt primarily with processing and recognition of images, speech recognition, programming in natural languages and systems programming the robot's actions.

That the conference was very much needed and that it aroused a lot of interest can be seen from the number of papers submitted to the conference, 100 of which were presented. Discussion over so large a quantity of papers was made possible due to the fact that like the presentation, it took place in seven concurrently debating thematic groups:

- the mechanics of industrial robots,
- elements and subassemblies of industrial robots,
- applications of industrial robots,
- economic and organizational aspects of automation,
- flexible production systems, and
- artificial intelligence.

A drawback to such organizational setup was that it did not give the participants a chance to listen to all the papers, even in two thematic groups. All the papers have been printed in four volumes of the proceedings of the conference published by the Institute of Technical Cybernetics of the Wroclaw Polytechnic Institute. Their titles are "Robotics and Artificial Intelligence," "Robot Mechanics and Control Systems," "Robot Design and Application" and "Robot Electronics and Flexible Production Systems."

Two panel discussions were organized during the conference. One of them dealt with the problems of training and education in industrial automation, the other--with perspectives and slowdown of automation development in Poland.

Three film presentations were made during the conference. The films were "Robots RIMP 401 and RIMP 1000" by the Institute of Precision Machines, "Possible Applications for Robots" by ASEA, and "Flexible Production System With ASEA Type IRb 60 Industrial Robot" by the Mining Industry Mechanization Center KOMAG. Industrial robot manufacturers ASEA and ESAB had their information booths at the conference. Books and other literature related to the subject matter of the conference were on display. And so was an industrial robot RIMP 402.

The conference aroused great interest, which was reflected in the number of its participants. The organizers decided to continue the subject matter of the conference at next conferences which will be held every two years.

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CSO: 2602/41

## EAST EUROPE/FACTORY AUTOMATION

### PRODUCTS SHOWN AT CSSR INDUSTRIAL ROBOT EXHIBITION

Prague TECHNICKY TYDENIK in Czech No 17, 22 Apr 86 p 6

[Text] The Fifth International Exhibition of Industrial Robots, Robot 86, took place at the Brno Exhibition Grounds from 26 February to 4 March. The accompanying R&D program of the CSVTS (Czechoslovak Scientific and Technological Society), the Robot 86 Congress, ran at the same time as the exhibit and met in three sections (New Directions in the Technical Development of Industrial Robots and Manipulators, Experiences in Implementing Robotized Working Areas, and Development of Applying Robotics in Nonengineering Branches). The exhibition was preceded by the seminar of the European Economic Commission of the OSN (United Nations) on Industrial Robotics 86, which took place in Brno 24 to 28 February. More than 150 participants from 27 countries discussed 60 papers there in four sections: 1) the latest developments in the field of robots and components for robots, 2) the economic and social consequences of robotics, 3) state and other programs and international cooperation, and 4) experiences from applications in individual fields.

At the end of February and the beginning of March, everyone in the country who has an interest in the application of robotics convened in Brno. After 2 years, this was again the sole opportunity to look over the results of the work of our R&D base in this field and to get acquainted with the exhibits of several foreign firms which want to trade with us. The Robot 86 exposition of exhibits coincided nicely with the Eighth International Exhibition of Welding Equipment, called Welding, where robots again took center stage, so that for the average visitor to Pavillion B of the Brno Exhibition Grounds, the two exhibitions blended into each other.

The exhibition was pleasing in the high technical level of the exhibits of domestic products. There really was a lot to look at and to admire, even though there was a lack of comparison with the products of several well-known foreign firms. Perhaps the strongest impression was made by the exhibition of the economic production unit ZTS (Heavy Machine Tool Enterprise) Martin representing a model of an automatic production system. It included the RPO robotic welding work area for arc welding in a protective atmosphere with the PR 32E robot and the DOM 200 (MZ 250) welding manipulator with the capability of programming by teach-in, punched card, and magnetic tape. There was also the M 63 industrial manipulator with dual grippers for handling items at

machine tools and transporters. The 7 RL2 automatic welding work area provides a comprehensive solution to automation of welding parts with dimensions of 1,000 X 1,000 X 8,000 mm and weights up to 250 kg. The weld can have the shape of a straight line lengthwise and in area, a circle, a spiral, or combinations of them. The manipulator has a drive with step motors and a pneumatic drive. Programming is by the teach-in method. The OJ 10 operational modular work area for arc welding in a protective atmosphere is equipped with the adaptive welding robot OJ 10 RS and two positioning robots OJ 10 P. They are controlled by the SM 54/30 adaptive system for 10 continuously regulated axes which can be equipped with up to four cameras with digital processing of the picture. The greatest novelty of the exposition (and perhaps of the entire exhibition as well) was the mobile robotic system based on an induction-controlled battery-powered cart which independently selects pallets from the warehouses and transports them to the technological work area.

The mobile robotic system consists of a stationary control unit for powering the track system, communications with the superior computer, and transmission of positions to the induction-controlled carts, as well as a track system including guidance tracks (poured in the concrete floor), block sections, dialogue positions and address points. The induction-controlled cart is able to reach high above with two extendable forks for moving pallets around. It has two variants: for one 1,200 X 800 mm pallet or for two 600 X 800 mm pallets, each of which can be controlled independently. The load capacity of the carriage is 2 X 315 kg, the lift from 4,500 to 2,900 mm, the current 24V/400A, speed 1 m/s, fork speed 0.2 m/s, number of guidance frequencies 6, maximum number of address points 999, maximum number of dialogue positions 16, precision of location in the horizontal plan plus or minus 10 mm and in the vertical plane plus or minus 5 mm.

There were also the traditionally great interest in the exhibits of the leading office in the R&D field with inter-branch authority, VUKOV (Research Institute--remainder of acronym as published) Presov. A highly favorable impression was made in particular by the roboticized work area for welding the frames of the high-lift carts with the APR 23 adaptive robot with drive for Desta Decin, equipped with the RS-4A control system. This same robot is supposed to weld the crosspieces of the freight car undercarriages in Vagonka Poprad. The AM 80 modular manipulator was presented in variants: for palletization of magnetized bricks (AM 80-03) and for spot welding the doors of trucks in Tatra Koprivnice (AM 80-01). There was also here a roboticized work area for nailing together the latticework transport crates for motorcycle with nails by the PR 32E robot. Of the other exhibits, let us mention at least the hanging track for processing items, the CHOP-16 diagnostic facility, the wide variety of switches, etc.

VUSTE (Engineering Technology and Economics Research Institute) Prague presented the new adaptive industrial robot APR 40 for various manipulations with technological tools, especially with welding tongs for spot welding. It is capable of also performing complex manipulations with heavier products in the automatic work cycle, for example, in palletization. The drives have

electric servomotors and synchronized transmissions. The RS 3/40 control system is programmed by the teach-in method. It is supposed to be produced in ZEZ (as published) Horice and for the first application Karosa Vysoke Myto is being considered. Another exhibit of the institute was a handling system with an operatorless cart guided on tracks with internal power. The control center determines the address, the best path, and activation of the means of slowing and stopping. The driving speed is 1.1 m/s, dimensions of the transport pallet are 800 X 600 mm, weight capacity is 500 kg, and speeds of loading and unloading pallets is 0.146 m/s. The handling system with the track-guided cart is supposed to be put together as a component part of the handling transportation system in the Chirany Modrany processing plant.

The exposition by the higher schools was also interesting. The engineering faculty of the CVUT (Czech Technological University) Prague improved its PR 20 welding robot, whose production is being prepared by CKD (Ceskomoravska-Kolben-Danek) Horice, by adding an automatic positioner. Its display also presented a single-purpose manipulator for spraying panels with plastering materials.

VUT (probably Institute of Technological Education) Brno presented an extensive display containing, among other things, the results of joint work of the VUT with production and research organizations; for example, in cooperation with Tesla Kolin they developed a monitoring system for the NS 915 programmable automatons. The display introduced the application of the AM 20 manipulator in connection with a machine tool for flanged components from TOS (Machine Tool Factories) Trencin, which is the work of the joint work area with VUKOV Presov. The PRKM 20 shop front industrial robot showed a subtle design, the work of employees and students of the chair of production machines and industrial robots of the VUT engineering faculty. Its drives contain step motors from MEZ (Moravian-Silesian Electric Appliances Plant) Nachod with an open loop. The electrical engineering faculty of the VUT also took part in the development of the drives. The robot can, for example, be controlled by the NS 510 system from ZPA (Industrial Automation Plants) Kosire with the NKM 05 feed for the step motors from MEZ Vsetin, in whose development the VUT cooperated with the Research Institute of Revolving Electrical Machinery in Brno. There was a preview of control of the robot with the SAPI-1 micro-computer at the exhibition.

The VST (College of Technology) Kosice also presented several results of its research and development work. The greatest interest was in the HYMR 50 hydraulic robot which was built by the employees of the engineering and electrical engineering faculty together with ZVL (possible Ball Bearing Plant) Presov, where it is to be produced. This is an original design solution based on electrohydraulic drives with measuring done with the aid of induction sensors.

One of the types of robots most in demand is that suitable for the construction of robot technology complexes for painting. Preparations are therefore being made for the production and complete supply of SM series spray handlers in Kovofinis Ledec nad Sazavou developed in cooperation with the

State Research Institute for Material Protection G.V. Akimov in Prague. Their employment is planned in Karosa Vysoke Myto. In this regard, the interest of the visitors to the Robot 86 exhibition centered on the SPR 10 industrial spraying robot with joint control which can also work in painting rooms where there is a danger of explosion (degree 1 of SNV (degree of danger of explosion)). It was developed in the Institute for the Development of Engineering of Consumer Goods in Piestany and it is supposed to be produced by Slovenska armaturka Myjava. It is programmed by the teach-in method and the microcomputer system is put together on the basis of the M 16 construction and the SM 50/40 with the application of the 8066 microprocessor.

CZM (probably Czech Motorcycle Works) Strakonice showed an automated technological work area for dimensional control and sorting of components with the PROB 20 robot, an improved version of the PROB 10 robot. Elitex Boskovice displayed an automated work area for sewing holes in the ends of shirt pockets using the MX manipulator with a needle arm. The work area can service up to three machines at once.

The hydraulics manufacturer TOS Rakovnik displayed the IPR 1-8 S1/E1-1 automated work area for handling turnings on wood lathes according to a program in connection with the automated cycle of the lathe. This involves shafts with a diameter of 20 to 80 mm and flanges with a diameter of 60 to 160 mm with a maximum weight of 2 X 8 kg which are selected from a hopper.

The Robot 86 exhibition showed that our research and development base has mastered robots with fixed program control and now is taking up systems with adaptive control. In the meantime, less attention is being given to assembly robots, with the exception of the APR 2.5 system from VUKOV Presov and some speciality items from VUMA (Research Institute for Mechanization and Automatization) Nove Mesto nad Vahom for microelectronics.

The robots and manipulators displayed mostly have a markedly unfavorable ration of their own weight to their capability (especially, for example, the IPR 1-8). It can easily be seen that they are made up of those components and assembly elements which are available and not from the best ones for the job, which underrates many interesting technical solutions. A more pleasant fact is the invention of two types of electric self-propelled carts for mobile roboticized systems. This is a basic condition for the further development of overall automation of our industrial and other production.

It is striking that there is so little participation by the nonengineering branches, who are meanwhile waiting for the mass production of robots. It is in just these branches that 55 to 60 percent of the workers are connected with handling heavy loads, demanding work, and work that is often harmful to the health. In the meantime, the first swallows of summer are showing up in the form of robotization of some operations in the production of construction materials and in the production of clothing and shoes.

For these and other reasons, it is a great and unavoidable task for our society to organize the mass production of selected types of industrial robots

TYP (1)	NOVNOST ka (2)	SOUŘADNI- COVÝ SYSTEM (3)	ČÍSLO ZNAČKY (4)	DRUH POHONU (5)	DRUH ŘÍZENÍ (6)	ROZSAH POHYBŮ mm (7)	MAX. RYCHLOST m/s (8)	PŘES- NOST POLO- HOVÁNÍ mm (9)	TYP ŘÍD. SYSTEMU (10)	VÝROBA (11)	APLIKACE (12)
PR 16 P	16	cylindrický (13)	5	pneumatický (14)	PTP nárážkový (15)	1000 H 500 V	1	±0,3	RS-1C	ZPA Prešov	manipulace (16)
PR 32 E	32	multiúhlový (17)	5	elektrický (18)	PTP	~1150 H ~2000 V	1	±0,5	RS-3	ZPA Prešov ZEZ Praha	svařování (19) manipulace
M4	2-4	cylindrický (13)	4	pneumatický (14)	PTP nárážkový dvouhoduotový (20)	630 H 200 V	0,6	±0,25	RS-1A	ZPA Prešov	manipulace (16)
AM 5	3-5	cylindrický (13)	4	pneumatický (14)	PTP nárážkový dvouhoduotový (20)	630 H 100 V	1	±0,2	RS-1A	ZPA Prešov	manipulace v plošném tváření (21)
MTL 10	10	sférický (22)	5	hydraulický (23)	PTP nárážkový dvouhoduotový (20)	700 H 700 V	0,8	±0,3	RS-1C	Vihorlat Suina	manipulace v tlakovém lití (24)
AM 1-T	1-25	kartézský (25)	2	elektrický (18)	PTP nárážkový dvouhoduotový (20)	1000 H 50 V	30 cyklů/min (26)	±0,2	vlastní (27)	ZPA Prešov	manipulace v plošném tváření (21)
M 40	40	kartézský (25)	2	pneumatický (14)	PTP nárážkový dvouhoduotový (20)	1150 H 60 V	15 cyklů/min (26)	±0,5	vlastní (27)	BAZ Bratislava (28)	manipulace (16)
M 63	63	kartézský (25)	2-5	hydraulický (23)	PTP	podle modif. (29)	0,5	±0,5	RS-1C	Vihorlat Suina ZTS Bardejov	manipulace (16)
UM 160	160	multiúhlový (17)	4	hydraulický (23)	PTP	2000 H 1000 V	1,2	±1,5	UPM 311 (SSSR)	Vihorlat Suina	manipulace (16)
APR 2,5	2,5-5	kartézský cylindrický (25) (13)	5-3 (23)	elektrický pneumatický (18) (14)	PTP	3000 H 300 V	1	±0,05	RS-3	ZPA Prešov	montáže (30)
APR 20	10	cylindrický (13)	6	elektrický (18)	PTP CP	1100 H 1100 V	1	±0,5	RS-4	ZTS Detva	obložkové svařování (31)
APR 40	60-80	multiúhlový (17)	6	elektrický (18)	PTP CP	960 H 1200 V	1,2	±1	RS-3 RS-4	ZEZ Praha ZAV Hořice	bodové svař- ování (32)
AM 80	80-160	kartézský cylindrický (25) (13)	6-3 (23)	hydraulický (23)	PTP	1400 H 1400 V	1	±1	RS-3	ZEZ Praha BAZ Bratislava	manipulace bo- dové svařování (34)
SPR 10	10	multiúhlový (17)	6	hydraulický (23)	CP	1000 H 2000 V	1,5	±5	vlastní (27)	SA Myjava	povrchové úpravy (34)
PROB 10	10	cylindrický (13)	6	hydraulický (23)	PTP nárážkový (15)	(920 H) (500 V)	(0,7)	±0,5	vlastní (27)	ČZM Strakonice	manipulace (16)
PROB 20	20	cylindrický (13)	6	hydraulický (23)	PTP nárážkový (15)	(940 H) (500 V)	(0,5)	±0,05 (mikro- posuv) (35)	vlastní (27)	připravuje ČZM Strakonice (36)	manipulace (16)
OJ 10	10	multiúhlový (17)	5(6)	elektrický (18)	CP	(940 H) (500 V)	0,4	±0,3	vlastní (27)	ZTS Detva	obložkové svařování (31)
IPR 1-8	2-8	kartézský cylindrický (25) (13)	5(4) (23)	hydraulický (23)	PTP	podle modif. (29)	0,4		NS 880	TOS Rakovník	manipulace (16)
AMR 20	2-20	kartézský (25)	4	elektrický (18)	PTP	(6002 H) (872 V)	0,4	±0,5	NS 880	TOS Trenčín	manipulace (16)
PRKM 20	20	kartézský (25)	3	elektrický (18)	PTP/CP	(3000 H) (1000 V)	0,5	±0,5	NS 510	ZEZ Jihlava VUT Jirno (37)	manipulace (16)
PR 20	10	multiúhlový (17)	6	elektrický hydraulický (18) (23)	PTP povzdělání CP (38)	(600 H) (1000 V)	0,7	±0,5	NURIS 730	ČKD Hořovice	svařování (39)
HYMR 30	50	multiúhlový kardézský (25) (17)	6 (25)	hydraulický (23)	PTP/CP	podle modif. (29)	1,1 rad/s (40)	±0,3	SM 50/50-1	? předpoklad ZVL Prešov (41)	manipulace (16)

Survey of Czechoslovak industrial robots and manipulators about which it was possible to acquire information at the Robot 86 exhibition. Even though some of the data is not totally precise (we estimated it from incomplete background information), the table gives a sufficiently good overview of a broad assortment of piecework production of robots in our engineering enterprises.

Key:

1. Type
2. Weight capacity in kg
3. Coordinate system
4. Number of levels of discretion
5. Type of drive
6. Type of control
7. Range of movement in mm
8. Maximum speed in m/s
9. Precision of positioning in mm
10. Type of control system
11. Manufacturer
12. Application
13. Cylindrical
14. Pneumatic
15. Contact
16. Handling
17. Multiangle
18. Electric
19. Welding and handling
20. Contact and dual value
21. Handling in surface forming
22. Spherical
23. Hydraulic
24. Handling in pressure casting
25. Cartesian
26. Cycles per minute
27. Integral
28. Bratislava Auto Plants
29. Depending on modification
30. Assembly
31. Arc welding
32. Spot welding
33. Handling of spot welding
34. Surface adjustments
35. Micro movements
36. Being prepared by
37. In development by
38. Later
39. Welding
40. Rads per second
41. Presumably

for general use. In doing this, great assistance can be given by the international cooperation by the CEMA countries, and information about this was available at the booth of the International R&D Association Robot with headquarters in Presove which has its first year of activities in the development, production, and delivery of roboticized complexes and flexible production systems behind it already. A further specification of cooperation is being brought about by specific specialization and cooperation agreements which are being signed during the course of 1986 as part of the Overall Program of R&D Progress by the CEMA member countries up until the year 2000.

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OVERVIEW OF MICROELECTRONICS PROGRAM

Budapest HIRADASTECHNIKA in Hungarian No 1, 1986, p 23

[Survey by Ferenc Gal]

[Text] It was in 1981 that the government announced the EDFP (Electronics Central Development Program), in which it assigned a prominent role to the development of component manufacture.

"Events have proved that little money was made available for carrying out the program," says Ivan Nemeskery, director of the Hungarian Communications Technology Association. Some 30,000 to 40,000 kinds of components are needed for producing the equipment. Hungary cannot manufacture such a range of items economically. This branch of industry grew 10-12 percent in 1984, and that sharpened the appetite for components as well. There are five enterprises in Hungary--Mikroelektronikai Vallalat, Hiradastechnikai Anyagok Gyara, Kontakta, Remix, and Kobanyai Porcelangyar--that manufacture components as their main output. These cannot supply all the needs of the industry. Equipment manufacturers expect more from the support industries. There is concern not only because of the 5-to-7-year lag behind the quality levels of Western Europe but also because these products are deficient in quantity too.

"The available supply of components is very scanty. Domestic manufacturers cannot keep pace with the development of the world market; they have one or two high-quality products, but that is not enough. For example, an entirely new technology, known as surface installation technology, is now getting started. According to advance indications, in the 1990's half of all instruments will be provided with subunits made by this method. We must prepare for this technology, since it will require totally different components."

Component manufacturers, who are on the other side of the counter, see these concerns differently. "It's natural that the selection we offer is not so wide as the industry requires," says Mihaly Sandory, director general of Mikroelektronikai Vallalat.

"Economical manufacture requires series of 2 to 3 million items, and we cannot prepare for batches in the thousands. For example, we produce 20-22 million IC's and about 60 million other semiconductors every year. Approximately two-thirds of our output is exported. We brought to the BNV (Budapest International

Fair) our most up-to-date circuits, the so-called BOAKs (equipment-oriented circuits), which rank in quality among the leaders in the field. The available supply of BOAKs is, in any case, more up-to-date than is required by domestic users. It is true, at the same time, that in the case of our catalog circuits the situation is reversed. In so-called bipolar technology, I must admit, our supply is behind the times."

"Do you plan to make preparations for surface installation technology?"

"We want to develop this technology during the next 2 years. We would like to do this through a loan from the World Bank, and we are now preparing our application for it. Despite the criticism directed at component manufacturers, these enterprises have developed very much during the past few years."

"For example, Remix Radiotechnikai Vallalat has increased its production from 680 million forints to 1.1 billion in 5 years. It has built, at a cost of 200 million forints, a factory to produce hybrid printed circuits, the technology for which they had purchased from a French firm. For the development of conventional components--capacitors and metal-layer resistors--they had received 100 million forints each from the OMFB (National Technical Development Committee) and from the Ministry of Industry. The layered capacitor manufactured under a Siemens license, which embodies 80 global patents, represents top-grade technology."

Janos Goblos, technical director of Remix, prefers most of all to talk about the surface installation technology mentioned above. "A revolutionary change is about to take place in the technology of installing printed circuits," he says. "This will require a totally new generation of components. However, the production of these subunits is still in the realm of our fondest dreams, primarily because of our financial capabilities."

Component manufacturers cannot create by themselves the capital needed for this."

(Kontakta Hirado, June 1985)

Table 1. Breakdown of domestic production of electronic components according to marketing (percent)

	1980	1985	
		EKFP*	íénybecslés
Hazai felhasználás	73	77	77
Szocialista expórt	22	13	19
Tókés expórt	5	10	4

Key:

1. Actual value (estimated)
2. Domestic consumption
3. Socialist export
4. Capitalist export

Table 2. Breakdown of domestic consumption of electronic components according to source (percent)

	1980	1985	
		EKFP*	ténybecslés
Hazai gyártás	51	66	50
Szocialista import	16	14	17
Tőkés import	33	20	33

Key:

1. Actual value (estimated)
2. Domestic production
3. Socialist import
4. Capitalist import

\*Prescribed guidelines of the central development program for electronic components and subunits.

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

ALBANIAN INFORMATION CENTER DIRECTOR VIEWS ACHIEVEMENTS

AU171704 Tirana ZERI I POPULLIT in Albanian 11 Jul 86 pp 1-3

[Interview given by Genc Xhuvani, director of the Center for Information and Technical and Scientific Documentation attached to the Academy of Sciences of the People's Socialist Republic of Albania, to Thimi Nika--date and place not given]

[Excerpts] Question: What are some of the achievements to date of the Center for Information and Technical and Scientific Documentation?

Answer: The creation and organization of this center took place as a result of a special instruction by Comrade Enver Hoxha at the Eighth AWP Central Committee plenum in June of 1980. Analyzing the importance of a contemporary and regular system of information in raising the efficiency of scientific work, Comrade Enver stressed at the plenum among other things that the creation of a center to process scientific information was an absolute necessity because existing methods were no longer adequate in following up the development and progress of science and in mastering the large volume of information processed and published throughout the world.

Following the initial difficulties during the first 2 years, which arose as a result of the lack of experience in organizing such a service in our country, the selection of suitable cadres, finding the necessary material base, and so forth, the center's real activity began during the second half of 1983. At first we started by securing and filing the information and the technical and scientific documentation available in our country concerning the fields covered by our terms of reference, which would be of service to the scientific and research institutions, production centers, and groups of scholars in tackling their scientific themes or in resolving production problems, and so forth.

The aforementioned bibliographical references are now being processed once again in accordance with the MISTRAL program, and so forth. In other words, they are being classified, indexed, and complemented once again in accordance with the demands of a new and final indexing model for reference and analytical documents, designed by our collaborators after becoming acquainted with the program. This will also be applied in a mandatory manner with regard to all

the new material to be processed, stored, and recalled in the (central) computers through the terminals of the center itself or of the cores, and will be used in future as the basic document in compiling reference and selective bulletins.

In cooperation with the specialists of the information network, the specialists of the center's processing sector created in May of this year for the first time in our country the center's automated data base in accordance with the demands of the MISTRAL program, opening up 11 fields and subfields covering the existing cores, and we are now at the stage of the gradual storing of the center's entire documentary stock. These are now being stored gradually in the memory of the central computers and it will be possible to retrieve them automatically whenever interested scholars and scientists may wish. This process will continue in the future to constitute one of the center's main activities.

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END